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The AUTOMOBILE

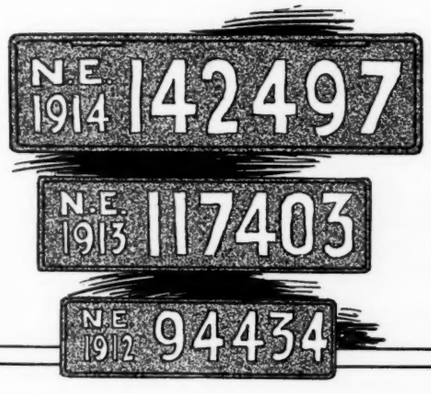
New England Gains 48,063 Cars in 2 Years

142,497 Cars and Trucks, as Compared with 94,483 in 1912—One Car to Every 52 People

By James T. Sullivan

BOSTON, MASS., March 1—Until a person has delved into statistics about the automobile industry, and these figures have been tabulated, he does not get any really comprehensive idea of what it represents. When, however, these figures are brought out it shows why the industry, as represented by the manufacturers, is such a marvelous one, and why it has enjoyed so large a growth. New England offers about the best example, comparatively speaking, of the reasons for the makers' success because, while it has a small area it has much wealth, and it was this per capita wealth that is an important factor in the buying of cars and their accessories.

Take New England to-day with its area for the entire six states of 66,424 square miles. In this country there are other states that are larger than all New England. Either New York or Pennsylvania have more people within their borders than one finds in the six New England states, and Illinois has nearly as many, which gives some idea of area and population. Yet in New England to-day there is one automobile for every fifty-three inhabitants, taking an average for all the six states.



New England Statistics

	1914	1912
Number of cars	142,497	94,483
Population	7,540,000	6,570,000
People per car	52	69
Total fees	$2,025,000	$1,070,000

Gains in 1914 Over 1912

	No.	Per Cent.
Number of cars	48,063	50.8
Population	970,000	14.8
People-car ratio	17	24.6
Total fees	$945,000	88.2

The number plates illustrate diagrammatically the number of cars in New England in the past 3 years

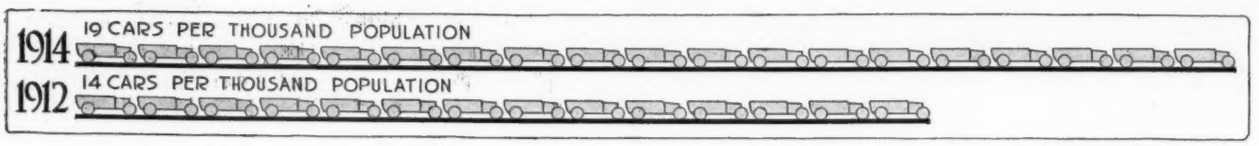
To give some idea of comparative figures, the 3 past years were gone over. In 1912 there were approximately 750,000 inhabitants in Maine, while in that year there were 7,743 cars; which equals approximately one to every ninety-seven people.

Last year the population, based on general averages, was about 800,000 and, with 14,240 machines, the per capita was approximately one to every fifty-six.

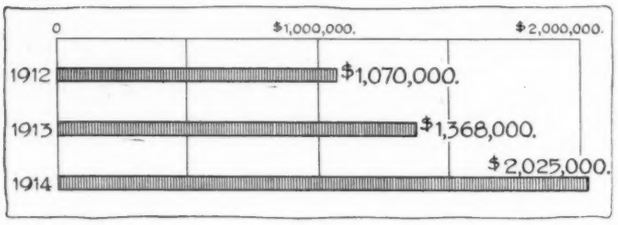
In 1912, New Hampshire had 440,000 people, and, with 5,764 cars, a ratio of one to every seventy-six; but in 1914, with about 463,000 people and 8,040 machines, it changed to one in every fifty-seven.

Vermont, too, showed a gain from 356,000 inhabitants in 1912, giving it one car to every eighty-two, while last year it was one to every forty-eight, based on 7,613 cars and about 370,000 population.

Massachusetts is the big fig-



There were nineteen cars per thousand population in the New England States in 1914, as compared with fourteen in 1912



A diagrammatic comparison of the total registration and other automobile fees received by New England States in the last 3 years

Approximate Fees Paid for Registration, Etc., in New England States

State	1912	1913	1914	Total	Gains 1914 as to 1912
Connecticut	$182,000	$233,000	$407,000	$822,000	$225,000
Maine	102,000	140,000	191,000	433,000	89,000
Massachusetts ..	492,000	616,000	926,000	2,034,000	424,000
New Hampshire	117,000	153,000	196,000	466,000	79,000
Rhode Island...	96,000	115,000	151,000	362,000	55,000
Vermont	81,000	111,000	154,000	346,000	73,000
Totals	$1,070,000	$1,368,000	$2,025,000	$4,463,000	$945,000

Dealers, Garages and Repair Shops in New England

State	1912	1913	1914	Gain or Loss
Connecticut	409	416	507	+ 98
Maine	98	202	300	+ 202
Massachusetts	952	978	1,233	+ 281
New Hampshire.....	141	150	230	+ 89
Rhode Island	142	148	203	+ 61
Vermont	103	101	98	— 5
Total	1,845	1,995	2,571	726

Cars in Massachusetts Cities

Boston	7,950	Salem	620
Worcester	2,955	Waltham	620
Springfield	2,840	Pittsfield	600
Newton	1,730	Fitchburg	530
Lynn	1,425	Medford	525
New Bedford	1,260	Beverly	455
Lowell	1,180	Everett	455
Somerville	1,175	Chicopee	425
Fall River	1,130	Melrose	425
Brockton	1,105	Gloucester	395
Haverhill	1,010	Northampton	340
Cambridge	785	Chelsea	290
Malden	765	North Adams	235
Quincy	740	Woburn	225
Lawrence	670		
Holyoke	655	Total	33,515

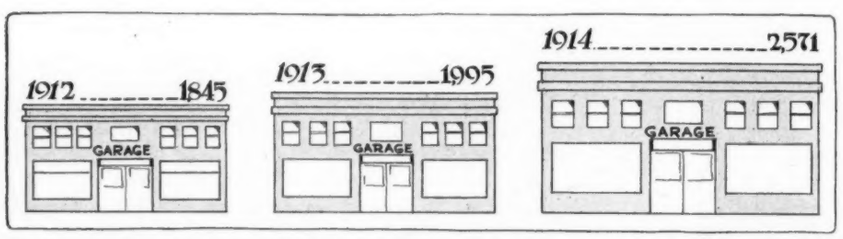


Chart illustrating the growth of dealers, garages, repair shops, etc., in New England during the past 3 years

ure in all New England statistics. In 1912 its population was 3,366,000 and with 51,229 cars it meant one to every sixty-six persons. Last year the figures grew so that an estimated population of 4,042,000 and 78,350 registrations gave it one car to every fifty-one people.

Rhode Island had 543,000 people and 7,565 cars in 1912, and this meant one car to every seventy-two people. Last year with about 600,000 people and 12,331 cars, there was a change to one in every forty-nine.

Connecticut in 1912 had 1,115,000 inhabitants and 17,950 cars, so there was one to every sixty-two. Last year there was one to every fifty-seven, based upon 21,923 cars to an estimated population of 1,265,000.

Totaling up the states, it shows that in 1912, with 6,570,000 people and 94,434 cars, there was one to every sixty-nine persons, whereas to-day, with an estimated increase to about 7,540,000 inhabitants and 142,497 cars, it is one to every fifty-three, a remarkable gain.

That this gain was productive of much wealth to the states is evidenced by the amount taken in by the states from their motor departments in the 3 years past, as it totals something more than $4,000,000.

Taking the states as individual units gives a more comprehensive series of figures:

In 1912 Maine had 7,743 cars registered. Last year, with 14,240, it showed a gain of 6,497.

New Hampshire had 5,764 cars in 1912 and 8,040 in 1914, an increase of 2,276.

Massachusetts, with 78,350 machines last year and only 51,229 3 years ago, had a gain of 27,121.

Vermont with 4,183 in 1912 and 7,612 last year added 3,430 cars in 3 years.

Rhode Island had 7,565 cars in 1912 and 12,331 last year, a gain of 4,766.

Connecticut, with 21,923 automobiles last year and 17,950 3 years ago, had 3,973 for its gain. These figures show 94,434 cars registered in New England in 1912 and 142,497 last year, or a jump of 48,063 cars in 3 years, an average of 16,021 cars a year. That gives a good idea of the consistently increasing way in which New England has been absorbing the product and in this way has helped to maintain the industry on its strong financial basis.

Fees Are Large

The fees by individual states are large. Maine received just over $100,000 in 1912; last year it received nearly double that sum and for the entire 3 years it has received well over $400,000.

New Hampshire collected nearly $120,000 in 1912 and last year received nearly $200,000, or over $460,000 in 3 years.

In 1912 Vermont received $100,000, but last year it got over $150,000. For the whole 3 years the state received about $350,000.

Massachusetts got the big share, the fees in 1912 exceeding $490,000 and last year they were close to the million mark. In 3 years Massachusetts received about $2,000,000 in fees.

Rhode Island contributions in 1912 were roughly $95,000 and last year about $150,000. Its 3 years' total was $360,000 in round figures.

Connecticut, with its fund of under

$200,000 in 1912 and over $400,000 in 1914, was just about double and in 3 years it received $800,000, giving a total for the five states of nearly $4,500,000.

It is not possible to go back very far to get an idea of the increase in dealers, but there are figures available to show how they have gained for the past 3 years. Take Maine: In 1912 there were ninety-eight men representing cars or handling accessories and garages in the various cities and towns. In 1913 the figures grew to 202 and last year to 300. That showed an increase in 3 years of no less than 200 per cent.

New Hampshire had 141 automobile business places listed in 1912, 150 in 1913 and 230 last year, gaining eighty-nine in 3 years.

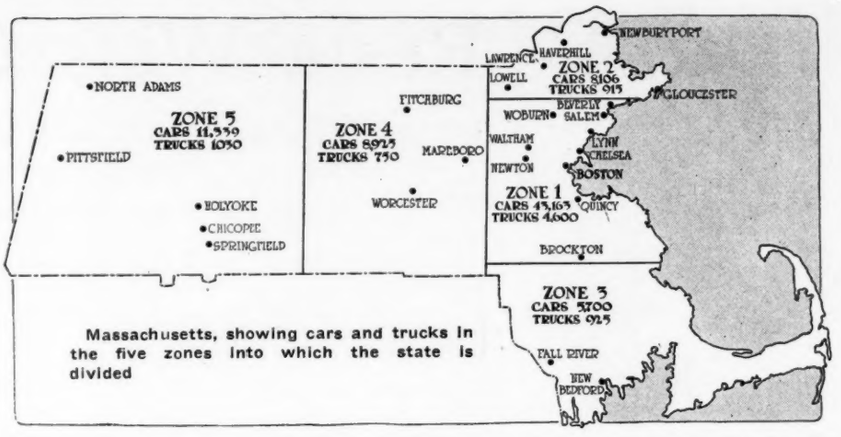
Vermont had 103,101 and ninety-eight respectively in the 3 years, showing a total loss of five traders.

Massachusetts trade showed steady growth, 952, 978, and 1,233 being the figures for the 3 years, 1912, 1913 and 1914.

Rhode Island figures were 142,148 and 203 for the 3 years, a gain of sixty-one altogether.

Connecticut had 409, 416 and 507 in the 3 years, a gain of ninety-eight.

At the same time there was a gain in the number of cities and towns where dealers, garages or repair shops could be found. This shows that the distributors are cutting down the territory and putting in more agents so that they will cover all available prospects more efficiently.



Massachusetts, showing cars and trucks in the five zones into which the state is divided

Cars and Trucks in Massachusetts Cities and Towns in 1914 by Zones

Zone 1

Beverley	455
Salem	620
Lynn	1425
Chelsea	290
Boston	7950
Quincy	740
Brockton	1105
Cambridge	785
Newton	1730
Everett	445
Malden	765
Melrose	425
Waltham	620
Medford	525
Woburn	225
	18,105
*Towns	25,058
Total	43,163

Zone 2

Lowell	1180
Lawrence	670
Haverhill	1010
Newburyport	145
Gloucester	395
	3400
*Towns	4706
Total	8106

Zone 4

Fitchburg	530
Worcester	2955
Marlboro	255
	3740
*Towns	5185
Total	8925

Zone 3

Fall River	1130
New Bedford	1260
	2390
*Towns	3310
Total	5700

Zone 5

North Adams	233
Pittsfield	600
Holyoke	655
Chicopee	425
Springfield	2840
	4753
*Towns	6586
Total	11,339

†Trucks 1

Zone 1	4600
Zone 2	915
Zone 3	925
Zone 4	750
Zone 5	1030
Total	8220

*Estimated.

†Based on averages of last year.

It was not possible to get the truck figures for all New England for some of the states do not keep a separate record. But the electric dealers keep track of the trucks they sell and so the figures on these for the past 2 years were secured. They are as follows:

State	1913	1914
Maine	4	4
Massachusetts	409	537
Rhode Island	20	45
New Hampshire	17	22
Connecticut	141	143
Vermont	3	1
Total	595	752

In Boston alone there are now 257 electric trucks. On the truck subject the Massachusetts registrations went above 8,000, showing an increase of over 2,000 in the course of 1914.

Last year THE AUTOMOBILE published a calculation of the trucks according to the distribution in the five zones into which the state was divided. So, comparing the figures of a year ago with those of the past year and striking an average it shows that approximately more than half the trucks are owned in the section that has Boston as its center. There is a pro ratio distribution elsewhere as shown by the map.

In the matter of passenger cars the lists of the different cities contain some interesting figures. Nearly half the cars out of the total registrations are owned by residents of thirty cities, leaving the rest distributed in the towns. Of course the greater number are owned in and about Boston, for within 5 miles of City Hall or the State House there are over 16,000 cars, this including about 8,000 in Boston.

A list of the cities shows that Boston with its 7,950 has twice as many cars as any other city. Worcester and Springfield are close rivals with only 115 dividing them. Newton ranks fourth, though it is not a big manufacturing or business city, being a large residential center.

20 to 30 Horsepower Cars

In the registration figures for Massachusetts it shows that the cars between 20 and 30 horsepower are still the favorite. In 1913 there were 12,731 of 20 horsepower and under, and the 1914 figures showed 16,911. The 20 to 30 horsepower class had 29,390 2 years ago and 35,806 last year. The 30 to 40 class had 9,145 and 10,848 and the 40-50 class 4,832 and 5,733 respectively. The 50 and over had 620 in 1913 and 635 in 1914. These figures do not include re-registration at half prices. It was possible to get the figures in Massachusetts for the past 6 years relative to dealers, chauffeurs, private operators, etc., from the highway commission. They show a steady increase year after year, as the accompanying tables indicate.

Number of Cars, Population and Ratio of Cars to People in New England

State	Approximate Population 1912	Approximate Population 1914	Ratio of Automobiles to Population 1912	Ratio of Automobiles to Population 1914	No. of Cars Allowing for Duplicate Registration 1912	No. of Cars Allowing for Duplicate Registration 1913	No. of Cars Allowing for Duplicate Registration 1914	Gain in No. Cars Since 1912
Connecticut	1,115,000	1,265,000	1 to 62	1 to 57	17,950	23,263	21,923	3,973
Maine	750,000	800,000	1 to 97	1 to 56	7,743	10,570	14,240	6,497
Massachusetts	3,366,000	4,042,000	1 to 66	1 to 51	51,229	60,826	78,350	27,121
New Hampshire	440,000	463,000	1 to 76	1 to 57	5,764	7,420	8,040	2,276
Rhode Island	543,000	600,000	1 to 72	1 to 49	7,565	9,894	12,331	4,766
Vermont	356,000	370,000	1 to 82	1 to 48	4,183	5,430	7,613	3,430
	6,570,000	7,540,000	1 to 69	1 to 52	94,434	117,403	142,497	48,063

Resta Wins Grand Prize

Peugeot, Skidding and Sliding, Covers 400.2856-Mile Track at 56.12 M.P.H. in Driving Rain—Wilcox, in Stutz, Second—Hughes' Ono Third

Winners of Grand Prize Race

Car	Driver	M.P.H.	Prize
Peugeot	Resta	56.12	$3,000
Stutz	Wilcox	55.26	2,000
Ono	Hughes	54.37	1,500
Stutz	Anderson	53.15	1,000
Simplex	Disbrow	52.79	500

Drivers Claim Course Is Not Fit for Vanderbilt—Many Wish to Withdraw

By A. G. Waddell

SAN FRANCISCO, CAL., Feb. 27—*Special* to THE AUTOMOBILE—Dario Resta, driving a Peugeot, today piloted his car to the front in the sixth grand prize race for the gold cup of the Automobile Club of America and $3,000 in prize money. He covered the 400.2856 miles or 104 laps in 7 hours, 7 minutes and 57 seconds, an average of 56.12 miles per hour and the slowest time ever made in the history of the grand prize, due to the fact that the major part of the contest was run in a driving rainstorm. The fact that the course was perhaps the slipperiest that drivers in a classic automobile race have had to contend with makes the story of the race one of the daring of the drivers as much as the stamina of the cars.

Although the victory is again the result of a foreign combination, American cars and drivers forced the victors to their utmost throughout the entire distance. Howdy Wilcox, driving a Stutz, was second to pilot his skidding mount across the finishing line. He was 7 minutes behind the Peugeot. Hughie Hughes, now an English citizen, driving an Ono car, a combination consisting of a Fiat chassis with a Pope-Hartford motor, was third. Gil Anderson and his Stutz took fourth money, and Louis Disbrow, with the Simplex of dirt-track fame, was fifth to complete the muddy journey and the last man to get the checkered flag of the starter, signifying the race was over.

Eight Still Running

At the time the Simplex finished eight other cars were still running. These were Louis Nikrent's Mercer, Harry Grant's Case, Tommy McKelvy's Overland, Kennedy's Edward special, Jack Gable's Tahis, Newhausen's Delage, Durant's Chevrolet and Taylor's Alco. Of the remaining cars ten had been withdrawn, not through mechanical trouble but because their drivers did not believe in taking chances on the slippery course. These included the following: Carlson, Maxwell; Alley, Duesenberg; LeCain, Chevrolet; Pullen, Mercer; DePalma, Mercedes; Herne, Case; Ruckstall, Mercer; Parsons, Parsons special; O'Donnell, Duesenberg; Gordon, Gordon special; and Bragg, Californian.

During the race seven cars were forced to abandon their attempt due to injuries which put them out of the race. Earl Cooper's Stutz, before the the opening of this great skidding contest, one of the favorites, sustained a broken crankcase after the fourth lap. The German Bugatti, driven by Marquis, had to drop out in the tenth lap with ignition trouble. Lou Gandy wrecked the Edward special, skidded into a straw bank on the northwest corner of the course, breaking his steering gear and putting himself out on the twenty-third lap. A broken piston on the Maxwell was the cause of Barney Oldfield's retirement on the twenty-ninth lap. Caleb Bragg, winner of the grand prize in 1912, was forced to abandon the contest after driving 126 miles because he had no non-skid tire in his pit. Rickenbacher's Maxwell dropped out on the forty-fourth lap, the reason being attributed to fouled spark plugs. Klein's King stopped in the forty-eighth circuit with a broken piston.

Although thirty cars were lined up at the start, the field was five less than that shown in the original entry list. The drivers who abandoned the contest, probably due to a premonition of the dangers of the course, were Erwin and Grover Bergdoll, in the Benz and Erwin special, respectively; Tomasini, pilot of the Tomasini special; Gates with the Renault; and Francis on the Francis-Blackman special. Nearly all held that the course was too dangerous to render the race worth while.

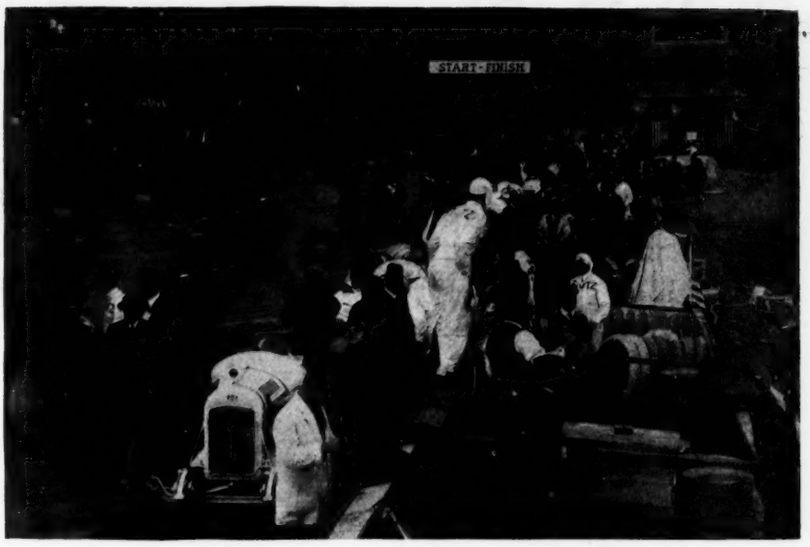
Speed Dropped 10 Miles

The race was started promptly at 10:30 a. m. by Starter Wagner who sent the cars away in groups of three. At that

time, although the weather was threatening, rain had not commenced to fall and did not until about 100 miles had been covered by the leaders. The pace up to this time showed that the time would have been close to the 70-mile mark had dry weather continued. Before the rain Resta was averaging 68 miles per hour and his pursuers were going more than 60. As soon as the deluge started the speeds were materially reduced and the two right angle curves on the course commenced to be taken at speeds as low as 25 miles per hour. After 80 miles, if it is reported, Resta equipped his car with non-skid chains on all four wheels.

The course of macadam and planks soon became so treacherous that ten of the thirty drivers who started withdrew, refusing to take further chances in the driving downpour. The 68,000 people in attendance experienced a series of thrills which rarely if ever have been equalled on an automobile race course. Car after car slid from side to side and once Jim Parsons turned completely around in attempting to avoid a statue on the course. His car was headed straight for San Francisco Bay when finally he managed to bring it to a stop. That no one was injured during the entire day is only due to the good fortune of the drivers. Lou Gandy narrowly escaped disaster when his car went head-on into a bank of straw breaking his steering gear. Neither he nor his mechanic was injured, although their escape was miraculous. Pullen and DePalma skidded into the hay bulwarks so often that the crowds on the turns began to accept it as a regular occurrence. The drivers themselves are amazed that they are all safe and sound and none of their mates are occupying any of the local hospital wards.

Ralph DePalma withdrew after completing sixty-seven laps. Although his Mercedes was in condition to continue he believed it was foolhardy to take any more chances on the hazardous course, especially in view of the fact that he is entered in the Vanderbilt Cup race to be run next Saturday and he did not wish to injure his prospects for that race. Two other favorites to withdraw were Barney Oldfield and Ed Pullen. This left the race to the dark horses. Resta had never driven in America before but he had become famed through his driving of the Sunbeam at Brooklands and his victory in the 1912 French Coupe de L'Auto. His daredevil driving soon brought the spectators to the realization that this new invader from Europe was a master of his car in wet treacherous conditions. The manner in which he guided his torpedo-shaped car in spite of the rain and on the greasy, slippery roads was a revelation.



A pit scene on the Vanderbilt and Grand Prize race track, with Anderson's Stutz in the foreground

Gasoline Cost Hughes $500

Hughie Hughes, reinstated within the week by the American Automobile Assn., was Resta's most dangerous rival throughout the struggle. He was always close to the winner and for ten laps showed the way. This was between the eighty-fifth and ninety-fourth circuit. At that time he ran out of gasoline on the back stretch and his mechanic was forced to sprint the course to the pits for fuel. The time lost in spite of the fleetness of foot of the mechanician was never made up and at the finish Wilcox led Hughes by 7 minutes. The gasoline required to go half way around the course cost Hughes $500.

Anderson and Hughes came among the moneyed five only after the fortieth lap was finished. At that time Ed Pullen was running in fourth place. At first the officials gave Disbrow fourth, but a rechecking of the tables put him in fifth place and the Stutz fourth.

Foreign-built cars have won the grand prize five out of the six times it has been run. The only American triumph was scored last February when Eddie Pullen, pilot of the Mercer, captured the trophy at Santa Monica. Previous to 1914, the winners were Caleb Bragg, in an Italian Fiat in 1912, David Bruce-Brown, Fiat, 1911, and Benz, 1910, and Louis Wagner in a Fiat in 1909.

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Drivers Protest Vanderbilt Course as Unfit

SAN FRANCISCO, CAL., March 1—*Special Telegram*—Unless there is a change of feeling among the drivers between now and Saturday, the Vanderbilt cup race, to be run over the Panama-Pacific exposition course March 6, will be a huge farce and the premier motor contest of America will be a comedy of laughs instead of a struggle of thrills.

At the completion of the water-soaked grand prize race, many of the drivers declared that they would not start in the Vanderbilt cup classic and threatened to leave San Francisco immediately. They will be compelled to remain, however, and start Saturday under penalty of being blacklisted by the American Automobile Assn. if they do not. Had they given formal notice of their withdrawal from the lists immediately after the announcement of the postponement of the Vanderbilt cup race from February 22 to March 6, they would have been safe and the governing body could not disqualify them. The drivers claim that the course is unfit for racing.

Despite the storm of protests and the existing dissatisfaction, the list of starters in the Vanderbilt cup race Saturday will be the same as that announced for February 22 with three exceptions. Erwin Bergdoll has been released by the management and has shipped the Erwin Special and the Benz, a reserve car, to Philadelphia. Bergdoll was injured in practice when his car went through the fence.

Tomasini may not be allowed to start as the other drivers claim that he is not capable. The Renault, formerly owned by Barney Oldfield and now the property of Ivan R. Gates, of San Francisco, also has been withdrawn. It was not permitted to compete for the grand prize as it was regarded as dangerous.

Equipment on Winning Cars in Grand Prize Race in Order of Finish

Car	Driver	Carbureter	Magneto	Plugs	Tires	Oil	Wheels	Motometer
Peugeot	Resta	Master	Bosch	Rajah or Oleo	Nassau	Oilzum	Rudge	Boyce
Stutz	Wilcox	Schebler	Bosch	Bosch	Silvertown	Monogram	Houk	Boyce
Ono	Hughes	Master	Bosch	Bosch	Firestone	Oilzum	Wood	Boyce
Stutz	Anderson	Rayfield	Bosch	Bosch	Silvertown	Monogram	Houk	Boyce
Simplex	Disbrow	Rayfield	Bosch	Bosch	Silvertown	Oilzum	Rudge	Boyce

S. A. E. Standards Committee

Two New Divisions—Summer Trip to Georgian Bay

NEW YORK CITY, March 1—Announcement has been made by the Society of Automobile Engineers of the personnel of the new standards committee and of the plans for the itinerary of the summer meeting of the society which will take place June 14 to 17 on board the *S.S. Noronic* in the waters of Georgian Bay.

In accordance with the custom of the society to annually revise the membership of the standards committee, the council at its last meeting made appointments of members for the year of the administration of President William H. Vandervoort. It will be noted that a new division has been created under the name of the International Standards Division and another known as the Chain Division. For the time being the aluminum and copper alloys division, broaches division, commercial car wheels division, data sheet division, motor testing division and standards exchange division have been discontinued for the time being. The commercial car wheels division has been combined with that devoted to truck standards.

The activities which the data sheet division has maintained will be continued through the office of the society in co-operation with members particularly well informed on the various subjects covered by the data sheets. The various matters which the standards exchange division has been working on, particularly the standardization of bell housings, will be taken in hand by the miscellaneous division. The divisions which have been discontinued are those which have finished their work insofar as it is at present practicable to carry it out.

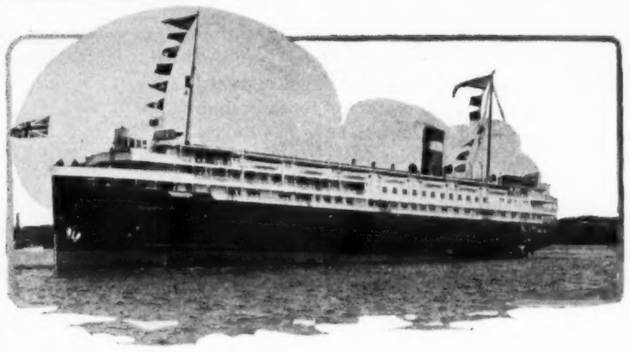
International Standards Division

The newly-created international standards division has been founded for the purpose of promulgating the standards of the society abroad and to formulate and assist in formulating recommendations as to the international standards relating to the design and construction of motor vehicles. The need of such a division has been particularly suggested by Past-President Leland who pointed out at the last meeting of the standards committee the difficulties involved in American car manufacture owing to the difference in the European and American standards of pneumatic tire rims. On this subject Mr. Leland's remarks were as follows:

"We are seriously handicapped by the fact that there is no standard, but chaos, in metric sizes. While our shipments abroad at the present time are comparatively limited, this is a considerable annoyance to us. While we are making but one size chassis, and so far as the American trade is concerned would like to use only one size wheel, yet we find today when considering the various types of the different makes of tires we have to use, we are carrying thirty-two types of tires. Insofar as the metric sizes are concerned, it means a different type and sized rim in many cases. That makes it necessary to have in stock wheels all painted to go with any given car. This is expensive and at times a serious handicap."

The council has established the same division in pursuance of the resolution passed at the last meeting of the standards committee to the effect that it is desirable to have a committee endeavor to formulate a standard tooth for silent chains.

As announced in THE AUTOMOBILE for February 18, K. W. Zimmerschied, past vice-president of the society, will serve as chairman of the standards committee during the year. Herewith is the new committee list.



S.S. "Noronic" on which S. A. E. will take summer trip in Georgian Bay, June 14 to 17

The Summer Meeting

The summer meeting will be held on board the steamship *Noronic*. This is the flagship of the Northern Navigation Co. fleet. It is 385 feet overall. This is a solid steel double-bottom vessel having six decks.

STANDARDS COMMITTEE

K. W. Zimmerschied, Chairman, General Motors Co.

Ball and Roller Bearings Division

F. G. Hughes, Chairman, New Departure Mfg. Co.

C. H. Clement, Metal Products — F. J. Jarosch, J. S. Bretz
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Alex. Churchward, Gray & Davis — Alden L. McMurtry, Consulting Eng.
W. H. Conant, Gould Storage Battery — R. J. Nightingale, Willard Battery
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C. E. Davis, Mechanical Eng. — C. W. McKinley, Willys-Overland

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E. R. Hall, Chairman, Goodyear Tire & Rubber Co.

H. L. Barton, Mercury Cyclecar Co. — J. G. Vincent, Packard
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Walter T. Fishleigh, Univ. Mich. — Daniel Roesch, Armour Inst.
C. B. Veal, Purdue Univ.

Springs Division

C. W. McKinley, Chairman, Willys-Overland Co.

A. C. Bergmann, Mercer — Ralph L. Morgan, Consulting Eng.
C. E. Clemens, Perfection Spring — W. M. Newkirk, Wm. & H. Rowland
C. F. W. Rys, Carnegie Steel Co.

Truck Standards Division

Wm. P. Kennedy, Chairman, Consulting Engineer

W. H. Allen, B. F. Goodrich — Robert McA. Lloyd, Consulting Eng.
B. B. Bachman, the Autocar Co. — C. T. Myers, Mechanical Eng.
George D. Carpenter, White Co. — F. F. Phillips
H. D. Church, Packard — A. C. Schulz, Locomobile
C. E. Clemens, Perfection Spring — E. R. Whitney, Com. Truck Co.
J. E. Hale, Goodyear — C. B. Whittelsey, Hartford Rubber
Russell Hoopes, Hoopes Bros. — John Younger, Pierce-Arrow

S.A.E. Gas-Electric Committee Reports

Metropolitan Section Hears Preliminary Results of Work of Research Committee—Two Classes of Drive—Officers Elected

NEW YORK CITY, Feb. 22—Last night's meeting of the Metropolitan section of the Society of Automobile Engineers, marked the close of the fiscal year. Besides the business coincident with the closing of the year, the subject of discussion was the report of the gasoline-electric research committee which was appointed early in the summer of 1914 to investigate and report on the status of this art.

Robert McA. Lloyd, consulting engineer, was elected chairman for the ensuing year, succeeding Joseph A. Anglada, who held that office for the last 3 years. J. Edward Schipper was elected secretary and Prof. W. C. Marshall, treasurer. Under a new form of Constitution adopted prior to the election, the Governing Committee is increased from three to five members, Ex-President Anglada and Niran Bates Pope, the retiring secretary, being elected as governors to serve for 1 year.

Membership Is 140

The financial reports of the section showed a balance on hand of $192.99 and a membership of 140. The secretary's report giving a review of the year dwelt particularly on the work of the research committees of which six were appointed but only in one instance, that of the gasoline-electric, had any real valuable results been obtained. It was pointed out, however, that this should not discourage the work as with new methods of attack, this can be made one of the most valuable branches of the society's work as the results will not only be available for the section members, but also for the Society at large through the transactions.

The report of the gasoline-electric division which consists of David Beecroft, THE AUTOMOBILE, chairman, W. P. Kennedy, consulting engineer and L. G. Nilson, Nilson-Miller Co., was in the nature of a preliminary report. It was divided into three divisions, read respectively by the different members of the committee. The first dealt with the nature of the work and the method of carrying out the investigation; the second dealt with the methods of classification and the description of the different systems which fell under these classes and the third, went into the history of the development of the gasoline-electric drive and the patent situation.

Twofold Classification

David Beecroft, who spoke of the methods used in carrying out the work, pointed out the difficulties in the way of busy men in bringing the results to a satisfactory close. He stated that the gathering of the data was more readily accomplished by the committee than the large amount of clerical work involved in its tabulation. He also pointed out the desirability of having the Society as a whole support financially the work of these committees. Mr. Kennedy pointed out the method of classification which was primarily twofold. The first classification included those vehicles in which the energy of the motor is completely transformed into electrical energy. The second classification included those drives in which a portion of the energy only is converted into electrical and the remainder is delivered mechanically. The committee was somewhat puzzled over the reception that would be given to the including of magnetically transferred drive into the second class as it was feared that many of the members would not agree with the members of the committee in terming a magnetic transmision one such as is used in the Entz, where the fields are positively connected to the motor shaft and the magnetic drag of these is relied upon to transmit the power. The slip in this case is the only portion of the drive which is transferred into electrical.

Thirty-six Gasoline-Electric Patents

Mr. Nilson in his discussion of the patent situation pointed out that no less than thirty-six American patents relative to gasoline-electric systems of transmission have been considered by the committee in the course of its investigation. In addition many modern patents have been gathered and descriptions of a number of systems which have never found their way into the patent office. The probable inception of the work was traced back by Mr. Nilson to W. A. Patton, in 1889.

The body of the report of the committee was that part rendered by Mr. Kennedy as follows:

In gas-electric vehicles, the transmission may be entirely electrical, that is, all the mechanical energy delivered by the engine is (by means of a dynamo) converted into electrical, and then again transformed into mechanical by means of one or more electric motors, connected in any suitable manner to the driving wheels. Or it may include a great variety of modifications using mechanical or electro-mechanical clutch devices and drives, in which case only a portion of the engine power would be transformed into electrical energy or the power of the engine may be entirely transformed into electrical energy for a part of the time in the operation. Storage batteries may also be used in connection with practically any of the combinations having D. C. machinery.

So many combinations have been used and proposed, that some scheme of classification must be made before studying or comparing the different systems.

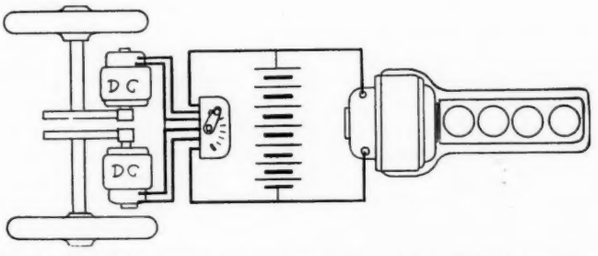


Fig. 1—Complete conversion system 1-A used in connection with a battery

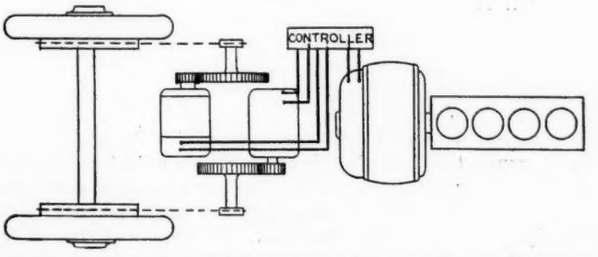


Fig. 2—Complete conversion system 1-B in which no battery is employed

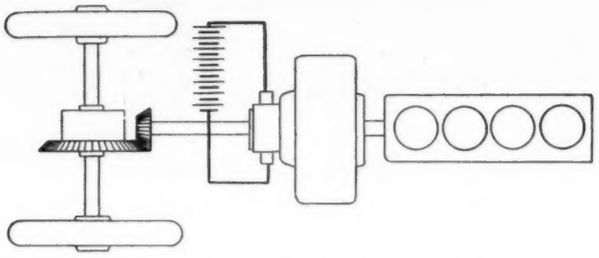


Fig. 3—Electro-mechanical system 2-A in which a battery is connected across generator terminals

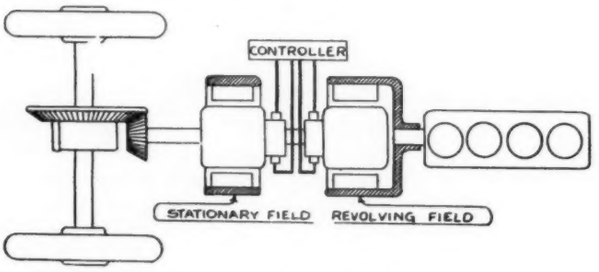


Fig. 4—Electro-mechanical system 2-B generator performing the function of the clutch

We would, therefore, divide the gas-electric systems into two main classes as follows:

First.—Complete Conversion Systems.

Second.—Electro-Mechanical Systems.

Complete Conversion Systems

The first—Complete Conversion Systems—include all equipments where, by means of a dynamo-electric machine, all the mechanical energy delivered by the engine is transformed into electrical energy, transmitted as such to the place wanted and then by means of electric motors reconverted into mechanical energy and delivered to the driving wheels.

Electro-Mechanical Systems

The second—Electro-Mechanical Systems—Comprise all the equipments in which the shafts of the engine, dynamo and motor are all in direct alignment, so that such portion of the engine power which is not converted into electrical energy may by means of some clutch mechanism be transmitted to the driving wheels.

The clutch mechanism may be entirely mechanical or it may be electro-mechanical; or the drag between the field and armature of the generator may act as a clutch; but, however that is done the final drive is electro-mechanical; a portion of the engine power may be transmitted to the propellor shaft without being first turned into electrical energy and reconverted into mechanical energy or the energy of the engine may be used electrically for starting or a temporary portion of the operation.

Each of the above main divisions can be divided into subclasses. For instance: the "Complete Conversion Systems" can be divided into sub-classes A and B; and the second main division "Electro-Mechanical Systems" can be divided into sub-classes A, B, C, etc.

As an illustration, we now have in Fig. 1 an example of the Complete Conversion System sub-division 1A, which consists of an internal combustion engine directly coupled to a D. C. generator, two electric motors mechanically connected to the driving wheels, a storage battery connected across the main leads between the generator and the motors; and the necessary switches and rheostats. The speed of the engine and the voltage are approximately constant, the maximum variation usually being from 20 to 33 per cent. The speed of the vehicle is governed by a controller the same as that of the conventional trolley-car or electric vehicle.

Fig. 2 represents sub-class 1B and shows the engine, generator and motors used mainly for cutting out, series-parallelling and reversing the motors. The speed of the vehicle is usually controlled by changing the voltage of the generator which can be accomplished by operating the throttle so as to change the speed of the engine. A rheostat can also be placed in the shunt circuit of the generator for controlling the field strength of same and used in conjunction with the throttle. Sometimes a separate exciter is used for controlling the field of the generator.

We now come to the second main division "Electro-Mechanical Systems" in which the total energy of the engine is not converted (for final employment) into electrical energy, only a part being so converted and the remainder transmitted to the driving wheels by other means. We have a number of variations in this division.

Fig. 3, 2-A represents the first sub-division of electro-mechanical systems combustion engine directly connected to a D. C. generator, the shaft extending through a system of gears to the driving wheels very much as in a conventional gasoline-propelled car. A storage battery is connected across the generator terminals, the idea being to have the electrical machine act as a generator charging the batteries when there is power to spare, and then again automatically changing into a motor to assist the engine whenever same is being overtaxed. For reverse running a coupling between the generator and the engine can be released and the generator operated in a reverse direction as a motor, or the engine and the generator may be connected permanently and a mechanical reverse used the same as in a conventional gasoline car, neither of these devices being shown in the illustration.

Fig. 4 illustrates the second sub-division 2 of electro-mechanical systems. In this case there is no actual mechanical coupling between the engine and the driving wheels, but the generator performs the function of a clutch for transmitting the engine torque to the driving wheels. The generator has the field magnets mounted directly on the engine shaft revolving around its armature. The armature shaft is extended and connected by means of the necessary gearing to the driving wheels. On this same generator-armature shaft there is mounted the armature of an electric motor sur-

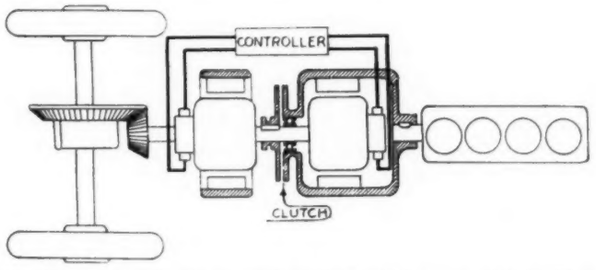


Fig. 5—Electro-mechanical system 2-C which is provided with a friction clutch

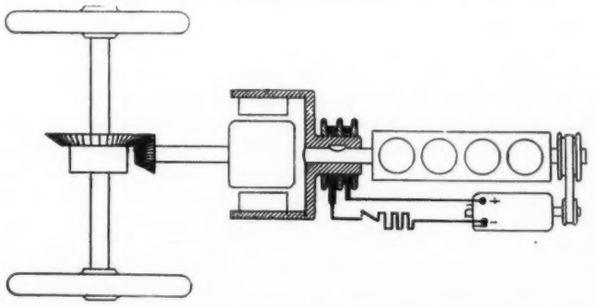


Fig. 6—Electro-mechanical system 2-D—magnetic clutch principle without engine torque increase

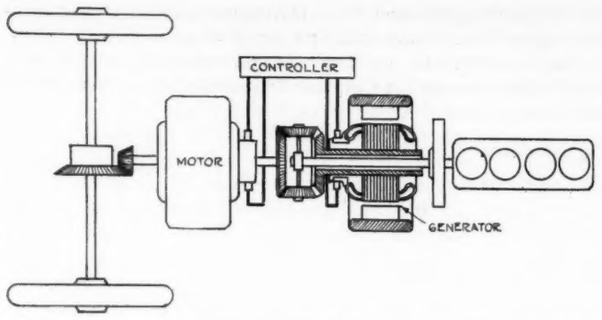


Fig. 7—Electro-mechanical system 2-E having a continuous mechanical connection

rounded by a stationary field frame. The speed of the vehicle is controlled by the speed of the engine, as well as by the amount of slippage allowed between the revolving field and the generator armature. On high speeds the electric motor is inactive, but the generator is short circuited, reducing the slippage to a minimum. On lower speeds when additional power is needed, the electrical energy produced by the generator is applied in the motor, which then acts as a booster increasing the torque.

Fig. 5 represents the third sub-division 2-C of electro-mechanical systems and is in general similar to 2-B except that a friction clutch is added for locking together the armature and field of the generator, entirely eliminating the electrical losses when running on high.

Fig. 6 of electro-mechanical systems and class 2-D of electro-mechanical systems is an example of the employment of the magnetic clutch principle but without provision for increasing the engine torque. A separate exciting dynamo is used, energizing the revolving field of the generator keyed to the propeller shaft. By means of a controlling rheostat in the circuit of the exciting dynamo the degree of magnetization of the revolving field is changed, producing any desired torque within the capacity of the engine.

Fig. 7 shows the fifth sub-division 2-E of the electro-mechanical system. In this case there is a continuous mechanical connection between the engine and the driving wheels, but continuous co-operation of the generator and motor is necessary for moving the vehicle. The engine shaft is extended to the spider portion of a differential on which are mounted the conventional bevel pinions meshing with a crown gear on each side. One of the crown gears is keyed to the hollow armature-shaft of the generator located between the engine and the differential. The other crown gear is keyed to the armature-shaft of an electric motor located between the differential and the driving wheels. This armature shaft is by means of suitable gearing connected to the driving wheels.

It will be noticed that the torque of the engine is evenly divided between the two electrical machines, so that the speed of the generator added to the speed of the motor is always double that of the engine. If, for instance, the motor shaft were locked, the generator armature would revolve at double the engine speed. The speed of the vehicle, therefore, depends upon the differential action between the generator and motor. By suitable control the field strength can be changed so that the speed of either machine can be made to vary between zero and double the engine speed. The current produced by the generator is applied on the motor which adds additional torque to that produced directly by the engine.

Discussion on Size of Motor and Generator

There was some discussion on a question raised by Louis Marburg, Marburg Bros., on the size and rating of the electric motor and electric generator necessary with the gasoline-electric drive. Mr. Nilson pointed out that the elec-

Gasoline-Electric Patents Issued

The following are some of the American patents that have been issued relative to Gasoline-Electric systems of transmission:

No.	Date	Name	Title
401,205	4/ 9/89	W. H. Patton	Street Car
424,817	4/ 1/90	W. H. Patton	Boat
475,702	5/24/92	W. H. Patton	Electric Car
489,709	1/10/93	C. Hering	Electric Motor
546,966	9/24/95	M. J. Wightman	Motor Control
614,709	11/22/98	G. DuPont and M. Johannet	Automobile Drive
671,662	4/ 9/01	H. P. White	Electric Motor
629,872	8/ 1/99	J. T. Robson	Electric Motor
675,846	6/ 4/01	A. Benson	Motor Control
675,847	6/ 4/01	A. Benson	Motor Control
675,848	6/ 4/01	A. Benson	Transmission
687,623	11/26/01	J. B. Hall	Transmission
714,154	11/25/02	A. G. Davis	Electric Distribution
732,062	6/30/03	J. B. Entz	Transmission
732,944	7/ 7/03	C. Jenatzy	Transmission
781,968	2 /7/05	J. Sachs	Dynamo System
786,376	4/ 4/05	L. G. Nilson	Gas-El. Vehicle
786,775	4/ 4/05	L. G. Nilson	Motor Control
801,355	10/10/05	E. J. Berg	Gas-El. Vehicle
801,823	10/10/05	E. J. Berg	Gas-El. Vehicle
801,898	10/17/05	H. McNulta	Transmission
805,188	11/21/05	H. E. Dey	Motor Control
808,263	12/26/05	E. Thomson	Gas-El. System
827,766	8/ 7/06	A. Weiss	Gas-El. System
829,827	8/28/06	E. H. Anderson	Gas-El. System
833,051	10/ 9/06	A. W. Harrison	El. Mech. System
895,618	8/11/08	L. K. Clark	Clutch-el. Idea
932,312	8/24/09	L. G. Nilson	Gas-El. System
1,080,447	12/ 2/13	A. H. Hoadley	Drive System

Main Division 1—Complete Conversion System

1—A With Battery*		1—B Without Battery*	
Patton	Krieger (1903)	North Eastern R. R.	Greenwood Battery
Fischer	C. B. & Q. R. R.	Fifth Ave. Coach Co.	Electrogenia
Strand	Hicks	General Electric	Alden Sampson
Neftel	C. & A. R. R.	Lohner-Porsche	Couple-Gear
Milde		De Dion Bouton	Blount & Lovell
		Gibbs	Hexter
		British T. H.	La France
		British Westinghouse	American-British
		Hart	Rankin Kennedy
		Tilling, Stevens	Krieger

Main Division 2—Electro-Mechanical Systems

2-A: Engine directly connected to D.C. generator, the shaft extending through a system of gears to the driving wheels-storage.

2—A*	2—B*	2—C*	2—D*	2—E*
Munson	Entz	Clark	Jenatzy	Carolan
Pieper	Renault	Hart-Durtnall		Thomas
Dowsing	Germain			
Astle-Wallis				
Farrow				
Thury				
Daimler (Caventus)				

*For explanation of these sub-classifications see accompanying text.

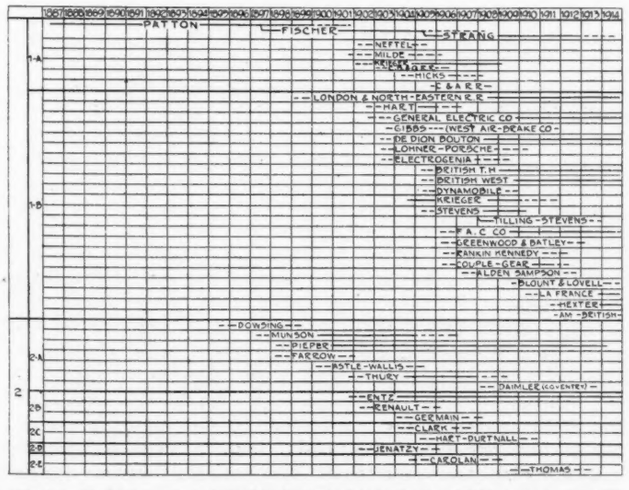


Fig. 8—Showing the chronological arrangement of the patents above listed

trical units can be small as they are not required to take the full load and furthermore the horsepower rating of the gasoline motors employed are frequently in excess of the power delivered. As an example he mentioned the use of a 3-kilowatt machine for a 15-horsepower engine used on a 1-ton truck.

Considerable discussion also hinged upon the point as to whether or not drives such as the Entz could be called mechanical. In this drive the only connection between the engine and the driving shaft is that provided by the magnetic attraction of the rotating fields for the driven armature. In answer to this Mr. Nilson pointed out that although the connection is not a positive one it is nevertheless mechanical in the same sense as the connection in a dynamometer in which the drag of the fields upon the armature or the armature upon the fields is taken as the measurement of mechanical horsepower. He furthermore showed that the only electrical energy created is that due to the slip between the fields and the armature.

The Efficiency Question

In regard to a question asked by Prof. W. C. Marshall on the efficiency of the gasoline-electric system, Mr. Nilson stated that no definite figures are available covering the entire apparatus. For instance, where a battery is used there is a 25 to 30 per cent. loss in charging and discharging and there is also a variation in the percentage of energy that is used for storing the battery.

Problems of the Eight Discussed

Engineers Consider Features Comparatively with Other Types—Decide Eight Makes Special Manufacturing Proposition—Must Be Well Made if Qualities Are To Be Brought Out

THE impression gained by reading the first brief reports of the discussion on the eight-cylinder motor held recently by the Indiana Section of the S. A. E. was that a large amount of extremely important work had been done. Subsequent conversations with several of those present, however, suggests that very few points of real novelty were brought out, and that knowledge concerning the eight was not advanced very much.

Reasons for the Eight

The main theme of J. O. Heinze's paper was that the eight-cylinder motor should be regarded as a step forward, on account of its greater evenness of torque, this being especially noticeable below road speeds of 15 miles per hour. Mr. Heinze said that what the automobile public desired was the nearest possible approach to a turbine, or truly rotary power producer, and that the eight must therefore be regarded as the best type yet because it approximates most closely to the turbine ideal.

Neither Mr. Heinze, nor the speakers in discussion, seems to have brought out the obvious point that in endeavoring to approximate to a rotary power producer there must be a limit beyond which it does not pay to go, because most of the arguments advanced by the author would have applied with equal force in stating a case for the 12, 24, 48, or any other number of cylindered motor. No doubt Mr. Heinze really intended to emphasize his opinion that the eight-cylinder had not been produced solely for the purpose of supplying something new for the public to buy, but that it was an engineering product the reasons for its appearance being sound engineering reasons.

Problems of Design

Mr. Heinze then proceeded to discuss the special problems in connection with the design and construction of eight cylinders. First, he explained by means of diagrams the already well understood difficulty in proportioning the oil so that both sets of cylinders receive an adequate supply without one set becoming over-lubricated. He then brought out the quite important point that forced lubrication, in which all the bearings except the piston pins are supplied through a drilled crankshaft, makes the best possible form of oiling; so that this feature of the eight-cylinder motor is incontestably a step forward.

He then dealt with the question of connecting-rod bearings and showed that the forked connecting-rod gave a larger bearing surface in proportion to the length of the motor and the dimensions of the crankshaft than it was possible to get by means of staggering the cylinder; or by any other means arranging two ordinary large ends side by side on the same crankpin.

A point brought out which has not been appreciated fully is that in the eight the crankpin is very much larger in proportion to the cylinder diameter than it has been made for four-cylinder motors; that is to say despite the forked connecting-rod a much larger bearing is provided for the large ends than is usual for any other type of motor. This should, of course, improve the durability of the bearing and Mr. Heinze stated that this should be regarded as highly important since to take down an eight would be very much more troublesome and far more costly than to deal similarly with a four-cylinder motor.

Cost of Manufacture

Discussing the cost of manufacture, he said that the reason the Northway motor had the cylinders cast in two blocks of four was that they believed it to be the cheaper way at present. He spoke in appreciative terms of the Ferro motor and said that possibly other concerns were mistaken in not casting all eight cylinders in one piece. That, however, is a point which time would have to decide.

He considered that the overhead valve type was distinctly attractive from several angles but that it would be much easier to obtain quietness in operation from the L-head cylinder and normal style of valve.

The next point dealt with was the two systems of valve operation. It was the author's opinion that using a single cam for opposite pairs of cylinders with the necessary interposition of rockers gave opportunities for error in timing which might be serious. The proportions of the rockers and the locations of their centers must needs be extremely accurate if the timing is to be true. It was for this reason that the Northway company preferred to use sixteen cams and direct push rods for the valves.

Carburetion, he said, was one of the principal troubles and he believed that at speeds below 1,000 r.p.m. the volumetric efficiency of the eight-cylinder is not as good as it should be; and this he thought could be accounted for by the

reversal in the direction of the flow in the intake manifold. This suggests that good results may be expected by careful experimenting with different manifold designs. It may be remembered that in the early days of the six trouble owing to uneven gas distribution was very usual and that this has been overcome in several different ways.

Frictional Losses

The next point dealt with was frictional loss and Mr. Heinze pointed out that this must necessarily be greater in the eight than with any kind of motor with fewer cylinders, because there was much more piston surface in proportion to the displacement. This point was taken up by W. G. Wall, who, in a rough calculation, showed that the amount of surface in the eight-cylinder exceeded that in the four by almost 40 per cent. Mr. Wall suggested that the placing of the carbureter above the cylinders was likely to produce trouble at slow speeds through gasoline draining into the valve pockets. In his reply Mr. Heinze said that he did not quite agree with this point and his only suggestion in relation to curburetion was that it was hard to obtain the same power per cubic inch. On the point of frictional losses another speaker afterwards stated that experiment with equal sized four- and eight-cylinder motors in the same chassis showed gasoline consumptions in the ratio of 10 to 12 in favor of the four. There was no difficulty in obtaining all the flexible qualities one could get with any other kind of motor and, of course, the number of cylinders helped very greatly to improve flexibility.

Mr. Wall briefly discussed the balance of the eight and voiced the idea that the amount of vibration which could be felt was in direct proportion to the number of cylinders used. It was also suggested that a rocking vibration like that produced by the unbalanced couple in a two-cylinder or three-cylinder motor was much more important from a sensory point of view than either vertical or horizontal vibration. One or two of the speakers did not make it altogether clear whether they were considering vibration or the torsional oscillation of the whole motor in the frame due to fluctuation in torque. In concluding his contribution Mr. Wall made the remark that the word accessibility was hardly applicable to an eight, but that some eights were worse than others.

Public Demand Ungauged

It was stated that the public were not greatly interested in the automobile as a machine for doing the work economically, that is to say, gasoline and oil consumption were not treated by them as a very serious consideration, and this point was taken up by Howard Marmon. In discussion he suggested that even if this were true today it certainly would not continue to be so forever, that the thermal efficiency of the automobile as a complete machine must ultimately be the main consideration.

As far as the greater smoothness of the eight is concerned Mr. Marmon pointed out that it was a question of whether the human frame was capable of differentiating between the number of impulses per minute above a certain frequency. This, he said, was a matter which could not be decided by engineers, which meant that it remained for the public to show whether they obtained greater satisfaction when riding behind an eight then behind a six. It was anticipated that it would take at least a year for the public opinion to become recognizable.

Mr. Apperson discussed principally the possibility of uneven wear on the connecting-rod bearings, the underlying notion being that it would be impossible for the ordinary repairman to readjust or scrape bearings of the forked end type. The general opinion was that wear would be much slower than in other types of motors and for this reason trouble in adjustment need not be considered. Allowing for the improved lubrication, usually a feature of the eights, this is probably a perfectly sound position to take up and it would not be a difficult matter to put in a complete new bushing to suit both the fixed and forked ends.

An Experimental Twelve

C. P. Grimes supplied some details concerning the twelve-cylinder V motor built by George Schebler for his own personal use. This had two sets of six-cylinders arranged V fashion and having a main crankshaft bearing between each throw of the crank. Instead of using either staggered or forked connecting-rods Mr. Schebler mounted a pin something like a piston pin at the lower end of one rod, the pin fitting in a bushing arranged for it at the lower end of the other connecting rod; that is to say six of the connecting-rods carried little lugs to one side of, and just above, their large ends, the other six connecting-rods being attached to these lugs. This provided large end bearings which could be adjusted limitlessly and the lower ends of the second connecting-rods can be regarded and treated exactly like piston pins. Mr. Grimes said that a trouble with this motor had been to prevent wear on the valve guides and that in a new design of twelve-cylinder, which was now being made, all the valves were arranged vertically with the object of overcoming this trouble. It was originally intended by Mr. Schebler to use the two sets of cylinders independently, keeping one set normally in reserve.

The remainder of the discussion ranged around the subject already dealt with, but did not extract much additional information. The principal new point brought up was that, if an ordinary four-cylinder magneto were used, owing to the fact that it has to run double the speed necessary for a four-cylinder motor, the ignition advance permitted is reduced to half. It was also suggested that some magnetos have not shown very good efficiency at extremely high armature speeds. There is, of course, no trouble with timer ignition.

The need for consideration of true economy was insisted upon by some other speakers and the author of the paper in reply said that he quite expected the efficiency of the eight to be brought up to standard.

It was questioned whether the cost of manufacturing the eight could possibly be as low as that of making six of equal displacement. Mr. Heinze in reply stated that ordinary improvement in manufacturing knowledge would enable eight-cylinder cars to be produced at prices no greater than those which were now being paid for six cylinders. He did not go deeply into the obvious question arising from this statement, namely, if improved methods of manufacture enable the eight to be produced for a definite sum, would not the same methods applied to sixes or fours allow a still greater reduction? Of course minimum price is not the most important consideration especially in considering the six-cylinder car and, as Mr. Heinze showed, the amount of money saved on the crankcase and crankshaft of the six-cylinder can be set against the cost of an extra cylinder block, extra pistons, and connecting rods, etc., required for the eight.

Seven Leading Points

Summing up the meeting the chief points made seem to be:

1. That carburetion is not perfectly simple and calls for experimenting.
2. That there are arguments in favor of the use of 16 cams instead of 8.
3. That the amount of piston friction in an eight is very high in proportion to other motors of equivalent displacement.
4. That the forked connecting-rod gives ample bearing surface and should provide excellent durability.
5. That engineers and salesmen are still undecided as to how the public will receive the eight.
6. Some special arrangements will be necessary to take care of the ignition.
7. Accessibility in the average eight leaves much to be desired.

Farmers of Southwest Could Buy 94,000 Cars at $1,000 Each

Kansas, Nebraska, Oklahoma and Missouri Have 68,144,200 Bushels of Wheat Worth $94,401,880, Still in Farmers' Bins—Other Crops Also Indicate Large and Continued Car Buying

KANSAS CITY, MO., Feb. 27.—There are four great economic matters that will have a bearing on the ability of the big grain and stock states of the Southwest to continue and increase their purchase of motor factory products this summer and fall as they have in the past. These are:

1—The price the winter wheat crop still on hand continues to bring.

2—The acreage and condition of the winter wheat crop—now in the ground—that will be harvested the middle of this summer.

3—The size of the coming corn crop.

4—The livestock situation as affected by the quarantines that have resulted from the outbreaks of the foot and mouth disease.

¶ This article begins a series of monthly industrial reviews on conditions in the southwestern territory embracing such states as Kansas, Missouri, Nebraska and Oklahoma, comprising an important section of the Mississippi valley, one of the greatest grain-producing regions in the world. Higher grain prices now in effect render this region a more promising automobile market than ever before.

¶ The author is one of the most widely-recognized authorities in this territory, having watched the progress of these states for 25 years while in daily contact with their leading financial and industrial movements.

Buying Will Increase

After a careful investigation among western bankers, grain associations and livestock men, it is apparent that Kansas, Missouri, Oklahoma and Nebraska—the big four of the Southwest—will not only continue to buy automobiles, but should continue to show an increase in buying. The other grain and stock states of the Mississippi and Missouri valley will show the same general conditions, with certain variations as, for example, in northern states where spring wheat is the heavy crop instead of winter wheat.

The Southwest has bought automobiles and is still buying cars on the winter wheat that was harvested last summer. Still in Kansas, Nebraska, Missouri and Oklahoma, it is estimated by grain men that there remains nearly 20 per cent. of that crop. Some of it is going to market gradually, some of it will be held until the new crop is close by. But the farmer himself right now is getting for all he is selling between $1.40 and $1.50, depending on his location.

What he may get if he holds on to the fifth of the crop he still has in his bins, of course, depends on war conditions. Indications are this week that he is holding pretty well, too. The exporters are sending grain that is in second hands and the farmers are sending less of their crop to market than they were at this time a year ago. Then figuring $1.40 a bushel (to be conservative) we have in the farmers' bins in Kansas, Nebraska, Oklahoma and Missouri this much wheat, worth as follows:

State	Bushels Still In Farmers' Bins	Value
Kansas	36,260,000	$50,764,000
Nebraska	13,623,200	18,072,480
Oklahoma	9,595,000	13,433,000
Missouri	8,666,000	12,132,400
Total	68,144,200	$94,401,880

The farmers apparently are so comfortable that they are in no hurry to sell this wheat. A large part of that is surplus, and surplus means automobiles everywhere. Enough wheat left over to buy 94,000 thousand-dollar cars in these states alone!

The winter wheat now in the ground: With the exception of Kansas, which shows only 2 per cent. less acreage than for the great wheat crop now selling, the states mentioned show a greater acreage. The report, with the exception of Nebraska, was not so good compared with the year before, but since that time conditions in both Kansas and Oklahoma have greatly improved. The war is still on. Kitchener says it will last 3 years. These great wheat states are prepared. Herewith is a table on the winter wheat crop—now in the ground—in the southwestern states.

Corn Is a Great Crop

Corn is a great crop in these four great southwest states. The corn crop means fall buyers. The preliminary condition is first class. The corn belt has had moisture and lots of it this spring and the indications are that the ground will be in prime shape for planting, a matter of no small consequence when the farmer is figuring the chances for his crop.

The animal industry is a trifle less pleasant to view at this time. Cattle only are affected by the quarantines established by the government and states because of the foot and mouth disease. At this time only Kansas and Missouri are open to stocker and feeder—breeding cows and cattle to be fed—shipments. There is a tendency, however, on the part of large stockmen and bankers handling cattle paper to view the slowing up of cattle shipments to market with equanimity. W. K. Kemper, president of the Commerce Trust Co., Kansas City, which handles much cattle paper, says regarding this:

"The drouth in Kansas, Nebraska, Oklahoma and Missouri two years ago took thousands of head of cattle out of these states as well as out of New Mexico and Texas. It shortened the breeding stock on the farms and ranches. The stock cattle that the Southwest does not ship to market this winter will be ready for market in the fall and where there was then a cow, in the fall there will be a cow and also a calf. The quarantine won't hurt; it will help to restock the Southwest and it's a creation of a new wealth in a very few months."

Crops Worth $1,113,036,000.

Adding to the interest of the man who makes automobiles is a look into the general wealth of the farm producers in the big grain and stock raising states. For example, take the value of all farm produce in the United States. Without the $3,828,000,000 for animal products, the total compiled from the 1914 figures of the Department of Agriculture is $6,044,000,000. In five states of the Southwest this year the value of thirteen field crops, corn, wheat, oats, barley, rye, buckwheat, flaxseed, rice, potatoes, sweet potatoes hay, tobacco and lint cotton is $1,113,036,000. This means of course that most of it is in wheat and corn, excepting Texas, where cotton counts, although cotton prices this year put Texas

lower than the 5-year average. Here are the five states:

State	1914	5 Years' Average
Kansas	$287,662,000	$164,844,000
Texas	288,335,000	336,725,000
Nebraska	210,099,000	153,869,000
Missouri	192,981,000	188,689,000
Oklahoma	134,159,000	117,618,000

And this does not include the crops of Minnesota and the Dakotas. Of course there is duplication to a certain extent in the department figures caused by the fact that it is hard to say what part of the value of animals is made up of hay and grain fed. However, it is sufficiently close to cause amazement at the comparison that may be made between the total of these five states and the entire country on farm products.

The banks as a barometer of business conditions in the Southwest make a good showing. Money is easy and abundant in the banks of Kansas City as well as all of its trade territory. December 31, the date of the last call on the national banks, the Kansas City banks showed deposits of $110,000,000, which was $9,500,000 in excess of the same time last year. It is estimated that since that call the deposits in Kansas City national banks have increased to $118,000,000. The bank clearings show an increase of from 25 to 45 per cent. as compared with the same time last year.

The next week or two probably will see tremendous strides taken in the jitney business and tremendous efforts as well to put the jitney out of business. In this city there has been a steady increase in the number of machines operating. Last Saturday, always a big transportation day, the jitneys in Kansas City handled 40,000 to 50,000 passengers. This meant from $2,000 to $2,400 was cut off of the Metropolitan street railway receipts that day.

The Jitney Still Grows

E. K. Carnes, traffic manager of the jitney station, estimated that 225 cars were engaged on the Saturday trips and that of this number about fifteen were buses, seating from eight to twelve passengers. The jitney carried the straphangers down in the morning and on account of the large number of Saturday shoppers coming down in the early afternoon and going home before the rush hours, kept busy carrying both ways all day.

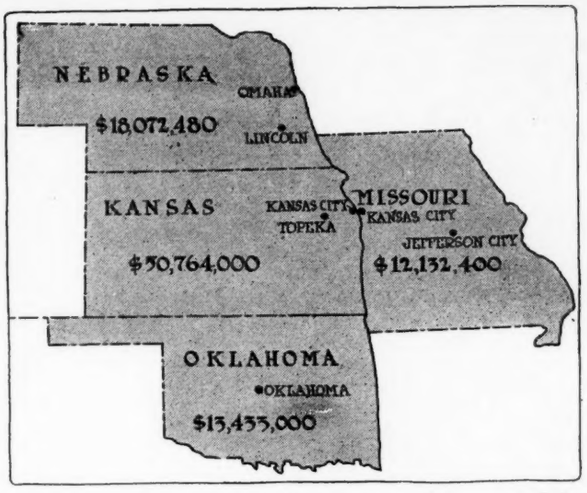
It is still too early to figure the outgrowth from this jitney business, whether it will be transformed into a bus seating from eight to ten persons or whether the small five-passenger cars will continue to do a large part of the business. Jitney buses seem to have a clear profit when they report fares averaging $16 a day. However, the $8 average of the small touring cars, in the estimation of local dealers, will pay good wages to the owner of a small car and take care of his expenses and depreciation.

The big question that is affecting the jitneys is the preparation of ordinances in Western cities to regulate them. The street railway influences are strong and not stronger elsewhere than here. Telegrams from coast cities and Texas cities where the jitneys are thriving say that to date no ordinances have been adopted, but that the jitney drivers and their patrons are watching every move of the street railway interest to put them out of business by the demands for liability bonds and heavy license fees. In Kansas City the street railway has appealed to friends in the city government which recently granted a 30-year street railway franchise. The ordinance will be taken up in council committee this week and the first week in March probably will see some sort of regulation. The city counselor's office, it is feared by the jitneys, will force a $10,000 liability bond for each car and a $10 license fee with a $5 occupation tax.

Of this the bond is the most serious as the jitney livery business will be put as a high risk by the insurance companies, if obtainable at all. This in view of the fact, too, that the street railway company has not paid a damage claim in 5 years as a result of its receivership. It has been unable to finance its new franchise on account of the war and the indications are that the jitneys will keep it in a receivership for a while longer. Just how serious a view the street car companies are taking of the jitneys may be had from this abstract from the *United States Investor:*

"Meeting with the popular approval as this jitney business has, if a movement is made to suppress them, some form of popular referendum will be invoked. The sentiment of the West does not furnish a very cheerful outlook for the street railway companies. The street railway companies are face to face with one of the greatest problems they have ever been called upon to face."

The United States Investor is friendly to the street car companies. It warns them of what to expect, and is it not to be expected that the street car companies will turn every stone to put this new motor industry out of business?



Map of Kansas, Nebraska, Missouri and Oklahoma, showing value of wheat still held in farmers' bins

The Automobile Show

With the close of the motor show, it is possible to make comparisons with the show last year. The paid attendance showed an increase this year of 39 per cent. over last year and 75 per cent. over the 1913 show. The total number of attendants was 140,000. The show committee has always kept the amount of money actually taken in a secret, but it is understood that the paid admissions amounted this year to $21,000.

As all of the proceeds of the show go to finance the show of the succeeding year, 1916 will see a demand for space that Convention hall with its 50,000 square feet will not be able to take care of. The dealers' association is planning the installation of a second balcony. Dealers do not wait for the show, but order cars months in advance.

Winter Wheat Now in the Ground in Four States*

State	AREA SOWN			CONDITION, DECEMBER 1		
	Autumn, 1913. Acres	Autumn, 1914		1914. Per Cent.	1913. Per Cent.	10-Year Average. Per Cent.
		Compared with 1913. Per Cent.	Total Preliminary. Acres			
Missouri	2,585,000	110	2,844,000	87	98	90
Nebraska	3,464,000	105	3,637,000	90	86	93
Kansas	8 958,000	98	8,779,000	80	100	90
Oklahoma	2,577,000	120	3,092,000	83	103	87

*From the Farmer's Bulletin, 645, United States Department of Agriculture.

Spark Advance Should Be Function of Flame Propagation

Curve of Advance Drawn in Proportion to Motor Speed Does Not Coincide with Best Results Obtained Experimentally

By Francis R. Hoyt,
Engineer Simms Magneto Co.

THE amount of spark advance or retard necessary for correct ignition, in a variable-speed, internal combustion motor, is the product of two time factors. First: The lag of the spark itself. Second: The rate of flame propagation of the combustible mixture.

The lag of the spark itself is a constant, and is in direct proportion to the speed of the ignition device, consequently of the motor. The rate of flame propagation, however, is decidedly variable, and follows no fixed law, constant or proportion, making very clear the obstacles which must be overcome when trying to compensate by a mechanically-operated spark advance, the physical and chemical irregularities which regulate the propagation of flame in gases.

Spark Lag

The statement has often been made, that "modern ignition devices have no appreciable lag." This subject cannot be handled broadly here, but from the illustration, Fig. 1, we can discover a lag in this specific case. This is an oscillogram showing the primary current, flowing in a battery ignition system induction coil, of the type commonly used with automatic advance. The line O represents zero amperage or current flow. Beginning at the left, the contact points are separated, showing a zero current flow, the points close at A and their action is accompanied by a growing-current curve, A to B. The shape of this growing-current curve is regulated by the design of the coil, and shows the inevitable result of self-induction, or that inherent property of an electrical circuit containing concentric coils of wire, and particularly an iron core, to oppose change; it is what might be termed an electric-magnetic inertia. At B the contacts open and the current falls to zero at C. The duration of time occupied in these changes is represented by the horizontal distances A-B, B-C, which, as shown, are .003 and .001 of a second for the growing and decaying currents respectively. The decaying current falls to zero in a very much shorter time than that occupied by the growth of the current on make, due in this case to condenser action, and the tendency of self-induction on break to aid by its own effect the rapid emptying of the coils. Each current change in the primary is accompanied by a corresponding change in the secondary of an induced current of higher voltage and lower amperage.

Lag of the Primary

Neglecting for the time being the secondary, and taking only the lag of the primary, we find an interval of .001 of a second between the actual opening of the contact breaker and the time taken by the current to fall to zero. As it is impossible for the secondary current to reach its maximum value until this electrical function has been performed, the amount of time consumed in this operation becomes an effective lag. This, however, is only primary lag, and, as the secondary must go through the same series of cycles, and also through the effect of mutual induction, we must have a secondary lag of at least as much, at a very minimum. Fig. 2 will show clearly the secondary lag, separately. In this test of which Fig. 1 constitutes a part, two galvanometers were used simultaneously, one for recording primary wave form and the other for the corresponding secondary wave.

Intervals of time are still represented on the horizontal line as in Fig. 1, so that by following down from B or the point of circuit interruption, to the secondary wave, a lapse of .002 second will be found between B and the actual occurrence of the spark, this being .001 second greater than the lag of the primary, and representing the total electrical lag in this case.

While this apparently small interval of time seems negligible as a quantity, yet in degrees of crankshaft travel it represents a necessary advance of .012 degrees for each revolution per minute increase in speed, in order to compensate spark lag alone. Or in other words, an advance of 6 degrees at 500 r.p.m., and 12 degrees at 1,000 r.p.m. The curve E of Fig. 3 shows the necessary advance for spark lag compensation for the coil shown here, with the different motor speeds.

Mechanical Lag

In addition to the actual spark lag as shown by the oscillograms, there is an interrupter lag encountered which is peculiar to the system from which these tests were made, and while it is purely a mechanical lag, and incidentally is exactly equal to the spark lag in this particular case, it is important that it be discussed separately, to avoid any possible confusion between the two.

The mechanical lag is shown by curve D, Fig. 3, and is due to the form of construction of the interrupter, this being so arranged that the cam which operates the breaker mechanism is rotating rapidly away from the lever actuating the break, which it sets in motion, that a certain small time lapse is entailed.

To go into the question of the rate of flame propagation: As was stated before this follows no regular law, constant or proportion, and consequently becomes a difficult proposition to analyze in figures; the only way in which it can be handled is to refer to the rate of flame propagation of the mixture at some given speed, which we have to determine

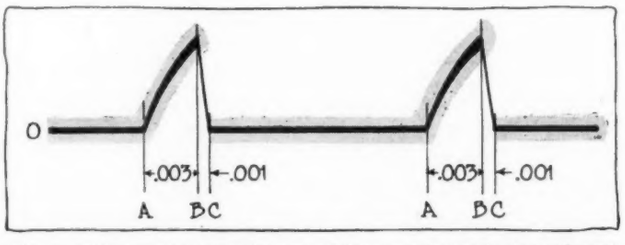


Fig. 1—Diagrammatic illustration of the current lag in the primary

by the correct spark advance necessary for maximum horsepower at this speed. At A, Fig. 3, is shown a r.p.m.-spark advance curve.

This curve was carefully complied from data secured by accurately calibrated laboratory instruments, and each reading was checked several times.

Determining Correct Advance

The motor tested was a four-cylinder, 3 5-8 by 4 7-8 inches, giving by the conventional S. A. E. formula, 37 horsepower. The ignition system used was the same as that from which the oscillograms were made, and while determining the actual amount of advance necessary for maximum horsepower, as shown at A, Fig. 3, the automatic advance attachment was prevented from moving, so that the spark was hand controlled, and the degree of advance noted from an indicator on the body of the timer housing, which moved over a sector calibrated in degrees, attached to the engine casting. This was originally set and checked throughout its range by a magnetograph. The revolutions per minute were recorded by a Weston electric tachometer, and the horsepower taken from a Sprague dynamometer.

The tests were all made with a fixed carbureter setting, without change of adjustment, and exhaust gas analysis tests with an Orsat apparatus, at a motor speed of 1,000 r.p.m., gave the following:

12.5 per cent. CO_2
2.5 per cent. CO
0.3 per cent. O

with a ratio of air to gas, by weight, of approximately 12.8 to 1; it having been demonstrated conclusively that the rate of flame propagation is at its maximum, other things being equal, at about a 12.5 to 1 ratio.

Exhaust gas analyses were made simultaneously with the power readings throughout the tests, but in order to arrive at some constant, such as is necessary to illustrate straight line automatic advance, the one analysis at 1,000 r.p.m. is given, which is as near an ideal flame propagation condition as can be reached.

If Advance Were Proportional to Speed

Referring to A, Fig. 3, we find an advance of 38 degrees necessary for maximum power at 1,000 r.p.m., or, in other words, a total rate of flame propagation—for the time being carrying all lag under this head—of 1-158 second at this speed. Suppose now this motor with a lag of flame propagation of 1-158 second at 1,000 r.p.m., to be running at 200 r.p.m., this would be 3.33 r.p.s., and 1,199 degrees on the flywheel would pass a given point per second. In 1-158 second—the time taken for flame propagation, assuming the rate to

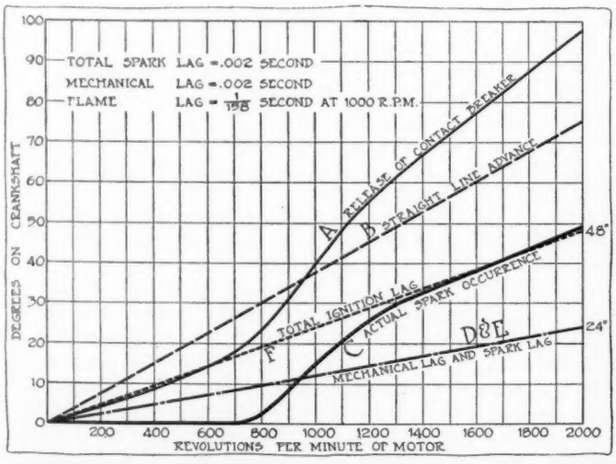

TOTAL SPARK LAG = .002 SECOND
MECHANICAL LAG = .002 SECOND
FLAME LAG = 1/158 SECOND AT 1000 R.P.M.
DEGREES ON CRANKSHAFT
REVOLUTIONS PER MINUTE OF MOTOR
A RELEASE OF CONTACT POINTS
B STRAIGHT LINE ADVANCE
C ACTUAL SPARK OCCURRENCE
D&E MECHANICAL LAG AND SPARK LAG
F TOTAL IGNITION LAG
48°
24°

Fig. 3—Curves showing different conditions of advance and lag factors. Note variation between curve A obtained experimentally and curve B showing straight line advance

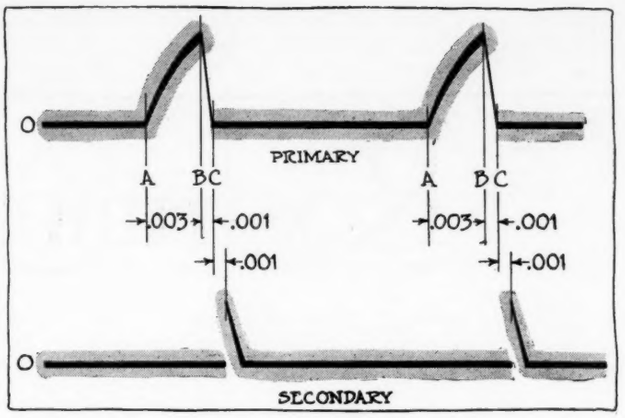


Fig. 2—Oscillograph chart of the current lag in primary and secondary concentric coils

be constant regardless of motor speed—the piston would have traveled a distance corresponding to 1,199-158, or 7.6 degrees of crank travel; thus, the spark must be advanced 7.6 degrees at 200 r.p.m. to compensate this lag; and by the same course of reasoning, it must be advanced 57 degrees at 1,500 r.p.m., or, in other words, the spark must advance in a direct proportion of .038 degrees for each revolution per minute increase in speed.

From the above, the curve B, Fig. 3, is plotted. A comparison of curves A and B shows at a glance that an advance such as given by B would fail to accomplish even fair maximum results. Careful analysis of curve A will also show a variation in the rate of burning of gases, which is typical of practical motor conditions.

Were the spark advance purely a function of speed, then the rate of flame propagation would necessarily be a constant, but inasmuch as it is not, and as there is no way in which it can be made to follow any prtdetermined form, it is obvious that the amount of advance must be regulated to suit the rate of flame propagation, as certainly the flame propagation cannot adapt itself to a predetermined advance.

In the explanation just given, descriptive of curve B, Fig. 3, the entire lag of the system was included in the lag of flame propagation for convenience of illustration. Examination of curve F, Fig. 3, however, will show that 24 degrees of advance are needed at 1,000 r.p.m. to compensate spark and interrupter lag. So that the difference between this amount and the 38 degrees given as necessary for flame propagation is the actual advance required at this speed for flame lag, or 14 degrees. This rule applies to any other point of the speed range as well.

Rate of Flame Propagation

The exact rate of flame propagation, therefore, is the small interval of time between the occurrence of the spark or the first ignition of the gas, and the instant of maximum pressure. This is due to progressive ignition.

Some of the more important conditions which cause this rate to be a variable, are:

First—The grade of the mixture, or the ratio of air to gas; a rich mixture, for instance, burning more rapidly than a lean one.

Second—Compression pressures have a very direct and important bearing on the rate of burning. Mixtures under high compression are more homogeneously mixed, and the molecules are in more intimate contact, allowing them to burn faster than the stratified charges of lower compression.

It is, therefore, apparent that the spark of an ignition system must not only be varied to compensate engine speed, spark lag, etc., but if correct ignition, economy or power is desired, it must also be made to vary with each change of mixture and degree of compression.

The Rostrum

Why Sleds Have Narrow Tread

EDITOR THE AUTOMOBILE:—*In reply to Dr. Wesinger in the Rostrum for February* 11, *will say that the reason for the* 38*-inch sled runner is this: The sled will have to travel in the horses' tracks. The snow in this western country is sometimes very deep and the track is* 2 *to* 5 *feet higher than the roadbed. A wide tread sled would straddle this track and slide on the cross pieces instead of on the runner. You could make the horses travel farther apart, but this would leave a soft center in the track into which the runners soon would find their way. On solid ice the* 54*-inch tread is all right. In a built-up track in soft snow the narrow sled has come to stay.*

Gilman, Ia. CHARLES LOUKS.

Carbon Probably Causes the Trouble

EDITOR THE AUTOMOBILE:—I have a model 6-50 Maxwell, 1913, and have had fairly good results with it, but I do not think it has the power and quick getaway it should have. The factory installed a different carbureter about a year ago, but the result is not much better. I have had a good deal of experience, this being my fifth car, also doing my own repairing, and I think the carbureter is too far away from the intake. The carbureter is on one side of the motor and the intake on the other. I think that the short manifold will give better results if the carbureter is placed closer to the intake, but on this car the magneto is in the way. What is your opinion on this?

2—Why did the factory discontinue making this model? D. C. H.

Johnstown, Pa.

—It is suggested that you remove the carbon from the cylinders as this is probably the reason for the loss of power. If the carbureter is adjusted correctly and the cylinders in good condition with good ignition this motor should be giving you satisfactory results. Relative to placing the carbureter closer to the intake, this arrangement was made in the position it now occupies so that the gas would become heated while passing between the cylinders, therefore igniting more readily and giving better results. In view of this it would be better to let the carbureter remain in its original position and to be sure that the cylinders are free from carbon, that the compression is good and ignition all that it should be.

2—The reason for the abandonment of the model 6-50 was the intention of the Maxwell company to concentrate higher manufacturing facilities on the Maxwell 25 model.

Explains Principles of High-Tension Ignition

Editor THE AUTOMOBILE:—From previous questions it is evident that there are very many men who are endeavoring to have an intelligent comprehension of the ignition systems of their cars, and there are two points which ought to be written in capital letters and kept before the eye until they cannot be forgotten.

The first of these is that there is no spark worth speaking of on the closing of the jump-spark circuit. The spark occurs only on the breaking of the circuit. With the vibrator the circuit is broken almost instantly by the magnetizing of the core in the spark coil, which attracts the vibrator head.

If there are four vibrators, one with each of the coils, it is easy to see that the slight differences in the spring tension or the character of the spring itself will produce a slight difference in the timing, and to this must be added the probability that each one of the contact points adheres very slightly owing to the incipient pitting, which shortly after the contacts have been smoothed, begins to affect the speed with which they can be separated, and long before the pitting is so bad as to hold the contacts fast together, it materially interferes with the rhythmic action of the coil.

The second point which I would emphasize is that there is no spark worth speaking of, and certainly none which would ignite gas under compression, to be had from any form of jump-spark ignition except in connection with a satisfactory condenser, connected across the contact points.

In the absence of such a pair of condensers, a heavy spark results at the contact points as they separate and almost no spark in the cylinder. It is for this reason impracticable to hold the contact points of the vibrator together and endeavor to utilize the timer on the engine to obtain a single spark. It is true that each time the timer breaks a connection there will be a slight spark at the plug, but there will be a wastefully heavy spark at the timer.

A very economical arrangement for a car using dry cells is that of a system utilizing a relay and a single vibrator, which for ordinary running allows but a single spark and yet cuts off nearly all the current almost immediately. With this system a single set of dry cells might be expected to outlast a season's running, even though used constantly and to the exclusion of any other means of ignition.

New York City. CHARLES E. MINIERRE.

—If the system is a non-vibrating one, there can be absolutely no spark at the closing of the circuit inasmuch as there is no energy present in the coil until the circuit is closed and the closing of the circuit does not change the intensity of the magnetic flux. It is this changing of the magnetic intensity that induces the current in the secondary coil, thus it can readily be seen that no spark will occur on the closing of the primary circuit.

Your assumption that the difference in spring tension or the character of the spring itself will produce a slight difference in the timing, is correct. There is generally a lag present in a battery system due to the factors mentioned by you. In general practice this lag is due to the rapidity with which the core becomes magnetically saturated, it also depends upon the distance that the armature is from the pole shoe and the voltage applied to the coil. All of these factors augment both mechanical and electrical lag.

It does not seem necessary to employ a pair of condensers

when a single one would suffice. This condenser is often so arranged that it is in parallel with the contact points when the contacts are closed and in series with them when open. In other words, such an electrical connection is made that it is possible for this condenser to take care of the rush of current which would take place at the time of opening the points.

Regarding the amount of current that single spark and vibrating spark systems will draw, it would seem that the biggest factor in the determination of the amount of current that any coil consumes would be the length of time that the contact points are together.

Uses Gasoline Mixed with Water

Editor THE AUTOMOBILE:—Some time ago I was told that a certain garage man in a neighboring city was using a mixture of water and gasoline to wash his cars with. The object of the gasoline was to cut the grease. That is all the information I have been able to obtain about the matter. Do you think that such a mixture will help cut the grease to any appreciable extent? If it will, how should it be applied?

2—Wouldn't a spray be the best form in which to apply it? Or would it be best to use a sponge?

3—Have you ever heard of gasoline being used in this way? If so, have you any arguments pro and con? I would be interested to hear them.

Ware, Mass. PERRY T. NAYLOR.

1—No doubt the addition of gasoline to the water in connection with sponging the car will efficiently aid in the cutting of the grease. It would have to be applied either in a spray or sponge as these are the only two practical methods of mixing it in such a way that it would combine closely enough to form a suitable mixture for cleaning.

2—The spray or sponge as explained would be the best method but it would have to depend upon the particular job as to which were the better method to employ. For cutting away an accumulation of dirt and grease the spray would doubtless be more efficient, but for cleaning a surface which had but a small deposit of grease, sponging would suffice.

3—THE AUTOMOBILE has no record of any discussions on the use of gasoline mixed with water and would say that beyond the precautions necessary for the use of exposed gasoline, there should not be any objection to its use. Kerosene is frequently used in this manner with good success.

Wants to Lighten 8-Pound Piston

Editor THE AUTOMOBILE:—I have a four-cylinder 5.375 by 5.5 L-head motor, the pistons weighing approximately 8 pounds, which I think is unduly heavy for a piston of this size. The heads of the pistons, which are concaved, are .375-inch thick and I would like to know how far it would be safe to go in making same thinner in order to avoid undue heating and possible pre-ignition.

I also contemplate drilling out the skirts of pistons, or turning them out on the inside. Would it be safe to reduce the walls to 1-8-inch or less?

The motor is supposed to have, when in perfect condition, a rated compression of about 90 pounds which I am thinking of lowering to possibly 65 or 70, all of which I presume would have a marked bearing on the possibility of reducing the piston head thickness.

To sum up, if I am able to lower the weight of pistons to approximately 6 pounds, do you think there would be enough gain in engine speed and elimination of vibration to warrant these changes?

I might add that I, of course, intend to carefully balance all reciprocating parts and possibly drill out the webs of connecting-rods to save weight of these parts.

I believe the maximum speed of this motor is approximately 1,800 r.p.m. and I am wondering whether in lowering the compression the speed or power of motor would be noticeably affected.

Garwood, N. J. C. L. EMMONS.

—If you intend reducing the compression there is no doubt that the pistons can be lighter because the strain upon them is less. Where the weight should be taken off, greatly depends upon the webbing and unless the head is well supported it would not be wise to take much, if any, from the head of a piston of this diameter. Probably it would not do any harm to cut down on the thickness of the skirt, but this should be done on a taper and not straight. It would seem safe, as far as can be told without examining the pistons themselves, to reduce the wall thickness to 1-8 inch at the bottom of the piston with a gradual slope to its present thickness at the wristpin boss. You do not state the arrangement of the rings, so this instruction can only be taken in a general way. Another point to remember is that when you are reducing the compression you are also reducing the maximum power output at high speed.

Drilling holes through the skirts of the piston will probably not do any harm, provided that these are spaced some distance apart. They must be so spaced for two reasons: one is that they act as reducing agents on the amount of oil which reaches the upper part of the piston, and another is that if they were too closely spaced they would weaken the continuity of strength of the piston structure.

In reducing the weight of the connecting-rods by drilling out the webs care must be taken not to materially weaken these rods which bear the entire thrust of power transmission from the pistons to the crankshaft and care must also be taken to keep the center of gravity of the rod in the same relative location. It must be remembered that the connecting-rod has a three-fold relation to the balance of the motor. The lower end is a rotating force, the central portion is oscillating and reciprocating and the upper end is a pure reciprocating mass. Therefore, to alter the center of gravity of this complicated balance feature, would be to introduce problems which would be, to say the least, somewhat complicated.

Timing of Autocar 1906 Runabout

Editor THE AUTOMOBILE:—I would like to get some information concerning the motor in the 1906 Autocar runabout, which has, as you probably know, a two-cylinder opposed four-cycle engine. The cylinders are about 3 3-4 inches by 4 and the intake valves are automatic. What should the timing of the exhaust valves be?

2—At what speed could the motor be run before the power curve falls off? For the service in which this motor will be used, it will be almost necessary to get 1,400 to 1,600 r.p.m., though for short runs only. If you do not believe that the motor can run at this speed

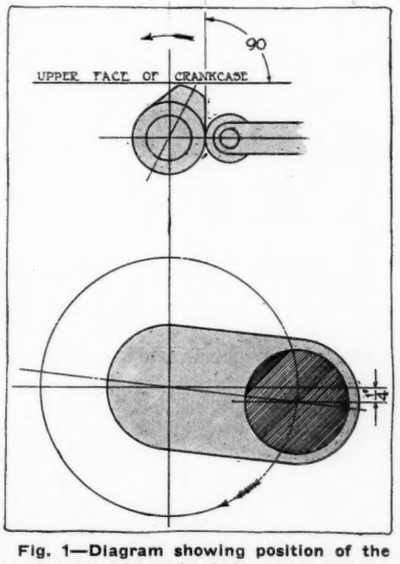


Fig. 1—Diagram showing position of the crank arm and cam in timing auto car horizontal double-opposed motor

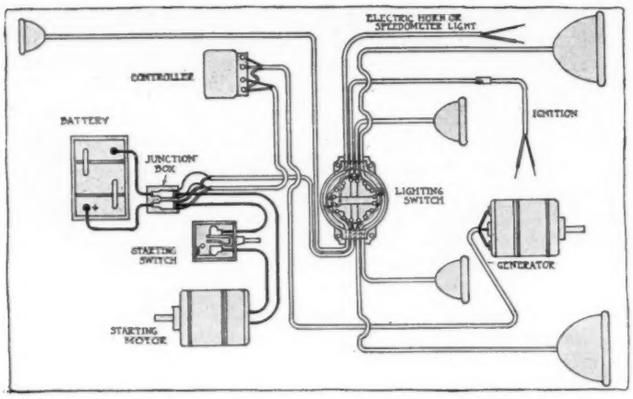


Fig. 2—Wiring diagram showing the installation of the Ward Leonard starting and lighting system as used on the Henderson car

please offer suggestions to remedy it by increasing the speed.

3—I also have a four-cylinder four-cycle T-head motor cast in pairs with cylinders 4 by 6 having 2 1-4-inch valves of the poppet type. The clearance at the top of the stroke is 5-8 inch, so the compression must be fairly high. What should the valve timing be for 1,500 r.p.m.? Do you think that the 1 1-4-inch Schebler carbureter is large enough, and also is a manifold 1 3-8 inch internal diameter large enough?

4—Do you believe that the two-plug system would give an appreciable increase in power over a single plug.

Ithaca, N. Y. ROBERT S. BASSETT.

—The timing of the 1906 Autocar runabout with two-cylinder opposed motor is as follows: The inlet valves are automatically closed by a spring which has an initial pressure of 2.5 to 2.75 pounds varying with the suction pressure of the motor. Both cylinders must be set the same. The exhaust valve closes at 18 degrees past upper center, as illustrated in Fig. 1. After setting the crankshaft so that the center of the crankpin is .25-inch past dead center, the after face of the exhaust cam should be perpendicular or at 90 degrees with the upper face of the crankcase.

2—The exact speed at which the power curve will begin to fall off will depend upon the condition of the motor but you should not have any trouble in getting 1,400 r.p.m.

3—For a good timing for the motor you describe, it is only possible to determine the time of opening or closing of the valve because the shape of the cam will determine the other function when one of these has been decided upon. The inlet valve should open at about 10 degrees past top center and the exhaust valve should close at about 5 degrees after top center. With these two points fixed the shapes of the cams in your motor will take care of the other function. Commonly the exhaust valve opens at about 45 degrees before lower center and the inlet closes at about 35 degrees past lower center.

4—It is probable that a two-point synchronized ignition would give an increase in the power curve.

Difference Between Two- and Four-Cycle

Editor THE AUTOMOBILE:—What am I to understand by a two-cycle and a four-cycle motor? What does the automobile manufacturer mean when he specifies two-cycle motor or four-cycle motor?

Pittsburgh, Pa. JAS. R. GALBRAITH.

—By the word cycle is meant a complete cycle of operations in the cylinder. In one complete cycle it is necessary for a gasoline motor to take in a charge of gas, to compress it, to fire it, to expand it and to exhaust it. If this cycle is completed in one revolution, or in two strokes, since there are two strokes to a revolution, one out and the other in, the motor is a two-stroke cycle. If it takes four strokes, or two revolutions, the motor is a four-stroke cycle. The word stroke has been dropped in common parlance and the abbreviated names two-cycle and four-cycle used instead.

In a two-cycle motor starting with the compression stroke, which is the up-stroke, the gas is compressed in the combustion chamber, fired at the top of the stroke, expanded on part of the down-stroke, exhausted on the remaining part of the down-stroke at the same time that fresh gas enters the cylinder, thus on the next up-stroke it is again compressed and fired. To complete a cycle it is only necessary to have two strokes for a motor of this type.

In a four-cycle motor starting with the up-compression stroke, the gas is compressed on one stroke, fired and expanded on the second, exhausted on the third and sucked in on the fourth.

Henderson Changed Electric Wiring

Editor THE AUTOMOBILE:—In the Ward Leonard generator as is installed on the 1914 Henderson, should a spark occur when a contact is made between the outside covering or frame of generator and copper springs that hold the brushes located just under cover plate of generator? I noticed a spark when I attempted to put a few drops of gasoline on the part where the brushes rub, the generator was not running. The battery has run down and I rather suspect that there is a short in this system.

Modoc, Ind. F. C. KABEL.

—Unfortunately, during the time the Henderson company was manufacturing the car it made several changes and each time there was a different type of lighting and starting system made by the Ward Leonard company for this concern. This makes it rather difficult to give detailed information, but you will probably understand the system by referring to the accompanying diagrams, Figs. 2, 3. The Ward Leonard system is an ungrounded outfit and there should not be any spark between the frame of the generator and the brush springs, unless the primary of the ignition circuit is grounded, in which case a connection made from the opposite of the line to the ground will give a spark under any circumstance.

If you will disconnect the ignition ground, if there is such a ground, and disconnect the horn ground, if there is any, there should be absolutely no spark between any live part of the lighting circuit and the frame of the car. If there is, this should be traced and remedied by an electrician.

Imperial Had Four 1914 Models

Editor THE AUTOMOBILE:—Will you please give me some information regarding the 1914 models of the Imperial Automobile Co., as to number of the model, style and price of same?

Owego, N. Y. F. L. RIDER.

—The 1914 Imperials were four in number. There were

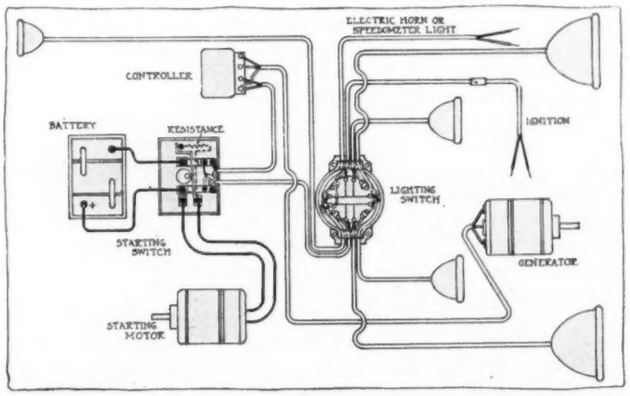


Fig. 3—Ward Leonard installation as used on the Henderson, showing connections of resistance and starting and lighting circuits

two fours and two sixes. The two fours were known respectively as models 32 and 34 and the two sixes as 44-6 and 54-6. The Imperial 32 sold for $1,500, the 34, $1,650, the 44-6, $2,000 and the 54-6 $2,500. The 32 is a 4.25 by 5.25 L-head block; the 34, a 4.5 by 5 L-head cast in pairs; the 44-6 a 3.75 by 5.25 L-head with the cylinders in threes and the 54-6 a 4.125 by 5.25 L-head with the cylinders in threes. All these cars are distinguished by unit power plants, helical camshaft drive, pump water circulation, Remy dual ignition, Stromberg carbureter, Northeast electric lighting and starting, disk clutches, three-speed gearboxes, bevel drive with a 3.5-1 final reduction. The wheelbase for the smaller four is 114 inches, for the larger 118, for the smaller six, 126, for the larger six 137. The tire sizes are 34 by 4 for both fours and 36 by 4 1-2 for both sixes. All had center control and all but the model 34 had left drive.

Long Stroke Used for Racing

Editor THE AUTOMOBILE:—1—Are the long stroke or short stroke engines used in automobile racing?

2—What is the bore and stroke of the Mercer, winner of the Corona race?

3—What does S. A. E. stand for in figuring the horsepower?

Cleveland, O. J. PARKS.

1—Both long stroke and short stroke engines are used in automobile racing although the tendency in the last few years has been very strongly towards the long stroke motor.

2—The bore was 4 13-16 and the stroke 6 3-16.

3—The initials S. A. E. stand for the Society of Automobile Engineers and the S. A. E. horsepower is meant to indicate horsepower figured by the formula which has been named the S. A. E. formula. This formula is $\frac{D^2N}{2.5}$ where D is the bore in inches and N the number of cylinders.

Schebler Carbureter Should Give Satisfaction

Editor THE AUTOMOBILE:—I have a 1911 Overland car model 56 which is equipped with a Schebler carbureter model R but it has never worked satisfactorily. Would you kindly advise me what to do.

Also, kindly let me know in the Rostrum how to wire a Master vibrator on a Ford. Or in other words, how to connect a Master vibrator to a Ford car.

Isanti, Minn. E. B.

—There must be some reason other than the carbureter itself for your trouble, because there are thousands of these cars in use equipped with the Schebler R carbureter that are giving great satisfaction. There is a possibility that you are troubled by air leaks in the intake line which thin the mixture to such an extent that it weakens the force of the explosion. It would be wise for you to examine carefully the manifold and carbureter connections and also the joints about the valves, spark plugs, etc.

A typical method of wiring a Ford Master vibrator is that shown in the accompanying diagram, Fig. 4. The vibrator is mounted in a convenient place on the dash, generally just above the steering post on the left side, as shown in the diagram. The switch of the vibrator is used to start and stop the motor and the switch on the coil is thrown over on the lead that connects to the vibrator. None of the timer leads or spark plug wires are disturbed. The vibrators on the coil are then screwed down tight to throw them out of operation or they are short circuited by using small bridges of copper wire, as illustrated.

Wants to Make Short Tube Bends

Editor THE AUTOMOBILE:—As a subscriber to THE AUTOMOBILE will you kindly tell me how the manufacturers are successful in bending the gasoline and other tube lines in short arcs without the pipe flattening?

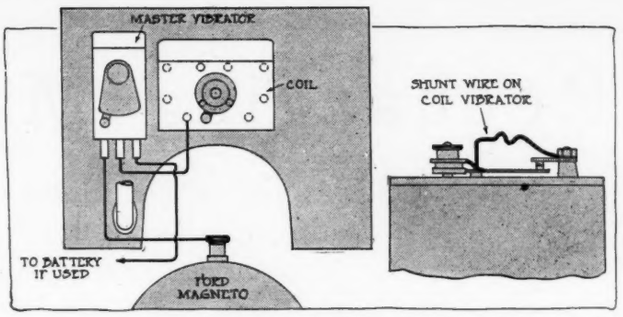


Fig. 4—Wiring diagram showing the method of putting a master vibrator on a Ford car

I have done considerable difficult work on cars, just for the fun of the thing, but my 5-16-inch copper tubing from tank to the Stewart vacuum and then to carbureter looks like a botch. The pipe always kinks at a short bend.

Philadelphia, Pa. WM. T. DICKSON & Co.

—Copper tubing of small diameter can be readily bent into short curves by melting rosin and pouring it into the tube. When this becomes cold it solidifies within the tube and the tubing can be bent like a piece of solid copper. After the desired bend has been obtained, the rosin can be run out by heating the tube with a blow torch. Another method sometimes used is to fill the tube with sand, but the rosin method gives the better results.

Instruction Books Furnished at Factory

Editor THE AUTOMOBILE:—Will you please publish a drawing or tell me where I can purchase a book of instructions about the 1915 Packard car? I seem to be unable to get one from our Worcester Branch. I should like to know the method of starting and what the appliances are on the switchbox of steering column.

Worcester, Mass. A CONSTANT READER.

—The instructions for the 1915 Packard car can be secured from the Packard Motor Car Co., Detroit. The method of starting the car is as follows: Place the change speed lever in neutral position, engage the hand brake, open the throttle 1-3, turn the auxiliary air valve hand wheel on the control board towards the position marked Gas and if the car has been standing for some time use the hand pump to obtain initial pressure in the gasoline tank.

Turn the ignition switch to M, set the spark lever just past mid position, and start the engine with the electric starter. The starting switch is attached to the crankcase and is operated by pressure on the heel button which is located on the level front floor board and connected to the electrical mechanism. The starter is operated by pressing down on this heel button slowly but firmly, the full length of its stroke. If the starting gears do not mesh properly at first, do not try to force them into mesh but release the pressure on the starting button and wait until starting motor stops spinning before again pressing on the heel button.

After the motor starts, turn the air valve wheel on the control board toward Air and set it at the point at which the motor runs best. Close the throttle until the motor runs slowly. To start the car in motion, release the hand brake, push forward the left pedal, disengaging the clutch, move the change speed lever backward into first speed position, increase the speed of the motor slightly and engage the clutch. This will start the car forward and after this the gear changes are made and the speed of the motor controlled in the usual manner.

The appliances on the switch board of the steering column are as follows: Speedometer lamp switch, headlight switch, auxiliary headlight switch, side light switch, tail light switch and electric signal button.

Recharging Magneto Magnets

Apparatus Required for Quick and Efficient Work—Methods of Testing for Strength—Pounding and Rubbing the Magnet During Charging Discredited

By R. J. Everest

MAGNET charging is a subject that is, as a rule, misunderstood, and one seldom touched on in automobile publications. As this is an important feature in the automobile trade, more reliable information should be obtainable and it is the purpose of this article to try to correct some of the absurd methods now in use.

Practical Charging Coil Required

In order to do satisfactory and quick magnet charging, the proper kind of equipment is necessary. That is, a charging coil that is designed on a practical basis and one which will be of sufficient strength to thoroughly saturate the magnet without consuming an undue amount of current. The design must also be such that an instant application of the current will be sufficient, as time means money in a repair shop.

Unsatisfactory Chargers

There are several different models of chargers in use and some are very unsatisfactory, but which are being used because a more efficient apparatus is lacking. One of the most inefficient of these is the wiping type. With this type the coils are wound on long, heavy iron cores, shaped into a U, the current generally being supplied by a 110-volt direct current line. The magnet to be charged is placed on the poles of the charger and pulled away from it. This is repeated until the magnet reaches its maximum strength. However, with a great number of chargers of this type the magnetism is insufficient to properly saturate the magnets, therefore failing to bring them up to their possible strength.

Another type in common use has the two coils wound on short iron cores, the cores projecting through and flush with the tops of the coils, with a bar across the bottom to complete the magnetic circuit. The magnet to be charged is placed with its poles to the cores of the charger. The chief disadvantage of this type is the long magnetic circuit necessary, requiring an excessive amount of current to properly saturate the magnet, due to the high reluctance of the circuit.

Shorter Magnetic Circuit

An improved model of this type has the cores extending only half way through the coils, and joined at the bottom with a heavy iron bar to complete the magnetic circuit. This model is a great deal more efficient as the magnet to be charged extends into the coils also, making a shorter magnetic circuit, an important factor in repair shop work, because she shorter the magnetic circuit required for each magnet, the more magnets can be recharged in a given time.

Considering these designs from a practical and technical standpoint, a charger of the solenoid type is the ideal design for all purposes. The coils are wound on hollow spools, with the holes in the center nearly the size of the magnets to be charged and an iron keeper is placed across the bottom of the coils to complete the circuit. This design gives the shortest possible magnetic circuit; therefore it takes the minimum amount of current to saturate the magnets.

Efficient Charger Design

An efficiently designed charging coil is shown in Fig. 3. The coils are adjustable to any size of magnet by providing one of them with a means of sliding along the base, allowing the holes in the coils to be comparatively small. An iron keeper is embedded in the wooden base immediately under the center of the coils so as to complete the magnetic circuit when the magneto magnet is in position. The wires are connected up as shown to two binding posts. A push button or switch may be inserted between one of the coil wires and the binding posts for convenience, but this is not absolutely essential, as the same result can be achieved by connecting the feed wire to only one of the two binding posts, touching the other binding post with the remaining feed wire when applying the current. A second's application of the current is all that is necessary to this type of charger.

This design will operate very satisfactorily, either from a 110-volt direct current line or from a 6-volt storage battery, the winding of course being suitable for the voltage intended. As a 6-volt storage battery is available in most garages, this source of power is most frequently used.

As a coil to magnetize permanent magnets is one of the oldest discoveries in the electrical field, the designing of one is purely a matter of furnishing a coil to thoroughly saturate the magnet with the minimum amount of energy.

In order to do proper recharging, a reliable means of testing the strength of the magnets must be had, as without this it is purely guesswork, and guesswork is rapidly disappearing from the automobile trade. A scale and keeper may be used as in Fig. 1, or a magnetmeter is still better and more accurate. When a spring scale is used, the keeper is placed squarely

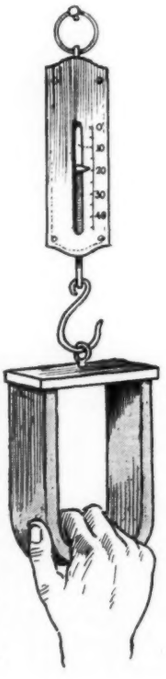


Fig. 1—Left—Testing the strength of a magnet with spring balance

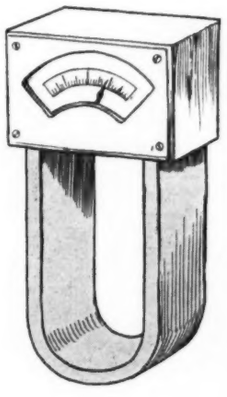


Fig. 2—Right—Testing with a magnetmeter

across the poles and the scale is hooked onto the center of the keeper. The magnet is now drawn away until the keeper is pulled from the magnet and the pull in pounds noted at the time of break. This should not be repeated as a slight loss of strength occurs after each break, due to the sudden change in the magnetic circuit.

When Magnetmeter Is Used

When a magnetmeter is used the magnets are placed with their poles to the side of the meter, Fig. 2, when the needle instantly moves to the correct strength. This is by far the most accurate method of testing, as no magnetic circuit is made and therefore there is no loss of power when the magnet is removed, no matter how many times this action is repeated.

When recharging magnets, they are placed in the coils with the N pole of the magnet to the S pole of the charger. This may be found with a compass or by holding the magnet over the coils, and at right angles to them, and applying the current an instant, when the magnets will tend to swing towards their proper polarity. The magnet is now placed in the coils and the current applied for an instant, when the magnet will be found to be fully charged. Any further application of the current is unnecessary.

Pounding Magnet Is Superfluous

The general practice and one that is advised by many electrical books, is to pound the magnet while charging. This will be found entirely superfluous, and a waste of time. This may readily be proven by charging a magnet in the usual way and testing its strength with the meter, then recharge it, pounding while doing it, and again testing, when the strength will be found to be the same as when charged the first time.

Another practice recommended by the same authority is the use of keepers after charging. As this is one of the oldest theories in regard to permanent magnets, it is hard to accept an opposite belief. However, like a great many other theories it has proved erroneous. *The use of keepers will be found to be a waste of time, as no loss is incurred through the absence of their use. In fact, a magnet may be laid away without a keeper of any kind, and remain full strength for weeks or months; this will be easier to believe by a little experimenting.**

In some cases where magnets are thrown around among pieces of iron or steel on the bench, it is well to place a keeper on them, as it protects them from magnetic disturbances.

Incorrect Use of Keeper

An ignorant use of a keeper is most harmful, particularly when a keeper is removed from the magnet by sliding it from the poles towards the top. This is easily seen by charging a magnet and pulling the keeper off in this manner and again testing, when it will be found to have lost nearly half of its original strength. The result of this practice can be easily seen and great care should be taken to avoid it, as a great loss is sure to occur.

Keeping Strength After Recharging

When the magnets are recharged and ready to replace on the magneto, they should be placed on the bench with all of their like poles together, that is all N poles on the same side. After placing the magnets in this position they should not be separated again, as they will lose some of their strength when the break occurs.

They should now be replaced on the magneto, still in this position, carefully forcing them all down evenly, and the screws replaced. Where magnets are replaced separately a loss occurs when one magnet is drawn past the other, due to the distortion of its magnetic field, thus consuming a part of the energy.

Some authorities recommend placing a keeper on the magnet until it is replaced on the magneto, then removing it by drawing it off towards the top. As explained before, this is very harmful. The purpose of this operation is to maintain an unbroken circuit of the magnetic field and a greater strength. Even if this were so, the strength thus gained would be lost when the armature was revolved a few times, due to the partial opening of the circuit and the resultant change in the magnetic circuit.

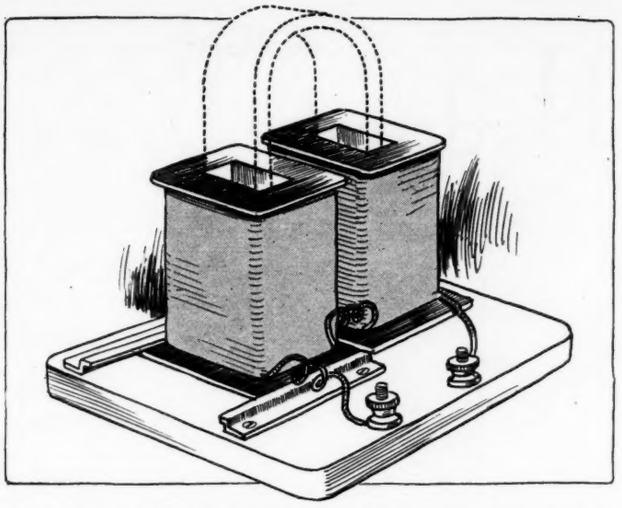


Fig. 3—Apparatus for charging magneto magnets. One of the two coils is provided with a means of sliding along a base between two guides, so that the centers of the coils can be adjusted to any size of magnet. The magnetic circuit, when charging, is completed through an iron keeper embedded in the base beneath the centers of the coils

When New Magnets Are Needed

Some magnets will be found that cannot be charged to a point where practical to use them. When magnets fail to come up to their proper strength they should be discarded and new ones used. When they fail to receive a proper charge when first charging them, no amount of charging will raise them above this point.

*EDITOR'S NOTE—This is at variance with the universally accepted theory on the use of a magnet keeper. According to most engineers the flow of the magnetic line from pole to pole across the air gap between these poles causes the magnet to do a greater amount of work than is necessary through the easier path provided by a keeper. The performance of work against the resistance of the air gap dissipates some of the magnetic energy and at the same time there is a tendency for the lines of force to be scattered to some extent and lost in the air surrounding the magnet. With a keeper, it is generally believed that the magnetic lines are confined to this path of least resistance.

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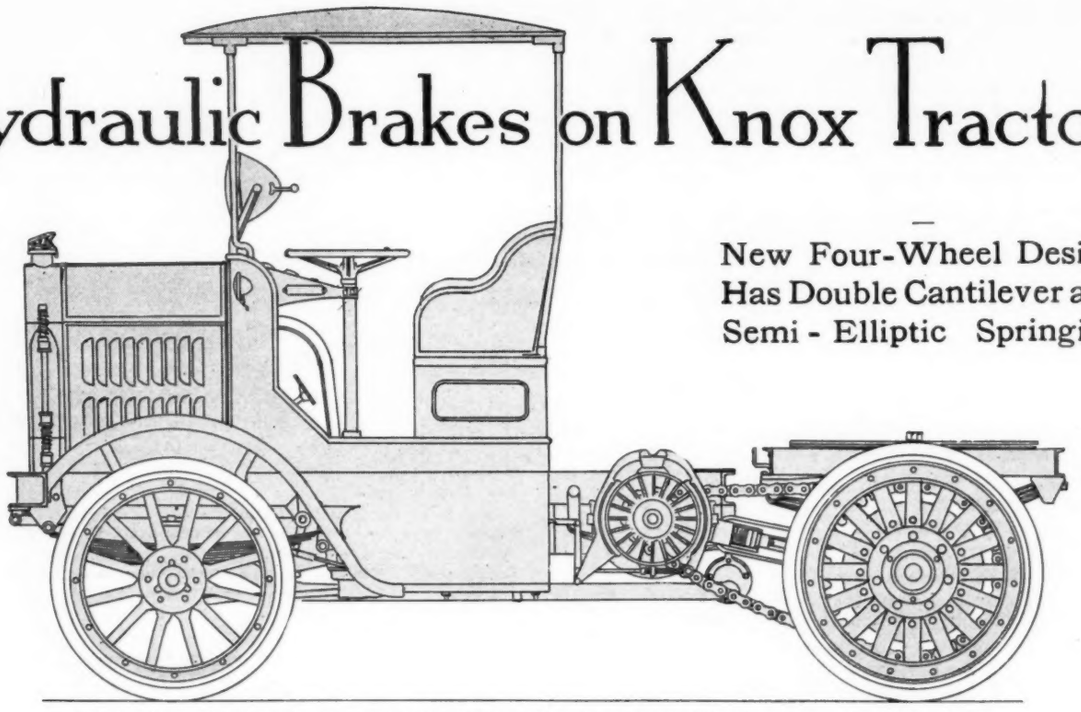
U. of Wisconsin Gives Automobile Course

MADISON, WIS., Feb. 26—The University of Wisconsin, through its Extension Division, is giving a course of ten lectures on the mechanical principles and operation of automobiles. Many owners and drivers have applied at the university for such a course and the university hopes to reach most of the important cities throughout the state of Wisconsin. Six experienced mechanical engineers on the staff of the Extension Division are available to give the course in different parts of Wisconsin.

The work was planned by Professor Earl B. Norris, who is in charge of the Mechanical Engineering Works of the Extension Division. Professor Norris was at one time experimental engineer with the Reo Motor Car Co., and he has as his assistants George W. Hobbs, formerly with the Buick company and Weston-Mott axle company and B. G. Elliott, formerly of the McKeen Motor Co.

Hydraulic Brakes on Knox Tractor

New Four-Wheel Design Has Double Cantilever and Semi-Elliptic Springing



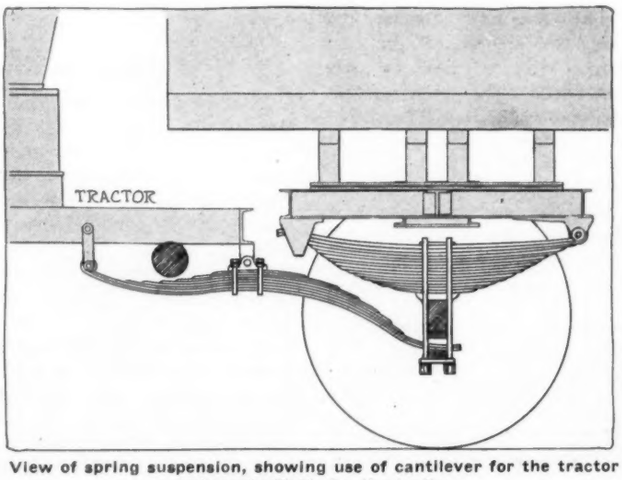
The tractor without the trailer attached, showing the cab, control mechanism, drive and fifth wheel

THE tractor which the Knox Motors Co., Springfield, Mass., has been engaged upon during the past few months has just been announced and shows itself to be an example of exceptional originality in this field. Rated at the unusual capacity of 10 tons, it is the result of the experience gained by the Knox company with their three-wheel tractor, to which are added features which are radical departures from the previous design.

Has Four Wheels

The new tractor has four wheels, whereas the previous Knox tractor had three. In addition to this there are new features which have not been seen heretofore, such as hydraulic brakes, a simple interlocking differential lock, a complete control board forming a brace between the top of the steering column and the dash and incorporating the speedometer oil pressure gauge, ammeter, lighting switches, ignition switch and fuses all in a position handy to the operator, a new design of gear oil pump mounted on the upper half of the crankcase and an automatic locking device for the jackshaft brake.

Throughout the design it will be noted that accessibility, exceptional strength and simplicity are the keynotes. The Knox tractor is characterized principally by its method of supporting the front end of the trailer. This is similar to the ordinary horse wagon except that the fifth wheel rests upon the tractor instead of on a front axle. The turntable upon which the trailer rests is mounted on a steel frame and supported from the tractor axle by heavy, semi-elliptic springs which are entirely independent from the rest of the tractor, and therefore renders the load of the forward end of the trailer entirely a matter of sprung weight. The tractor has its own springs which take care of the load at this part of the vehicle. These are of the cantilever type.



View of spring suspension, showing use of cantilever for the tractor and semi-elliptic for the trailer

Design Is Compact

Another improvement of the present Knox tractor over the previous models turned out by this concern is in the general compactness of design. Although the same style of power plant is employed, the engine hood has been considerably shortened and the axle has been brought well back to the radiator. In order to accommodate the full length of the motor with this arrangement the power plant extends slightly back into the driving compartment within a slightly curved inclosure.

Left Drive and Center Control

Left drive and center control are used on the new car, the steering column being vertical and having the triangular shaped control board with the instruments as previously enumerated. The control levers are placed between the two independent seats for the driver and his helper and are standard in every particular except for the small heel pedal which controls the differential lock. This has been rendered foolproof by the use of an interlocking mechanism which prevents the differential lock from being thrown into action unless the gearset is in neutral. After this has been thrown into engagement any of the speeds can be used in the customary manner.

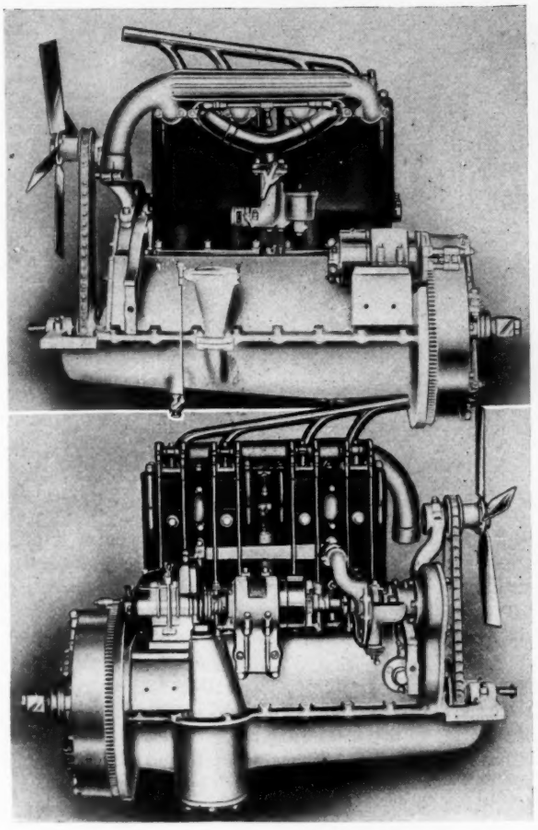
The handbrake lever is mounted next to the gearshift lever in the usual posi-

tion but instead of operating a series of linkages, it operates a hydraulic oil pump by means of which a great reduction is obtained and at the same time allows the operator to have a very delicate control. The brakes which are operated by this hydraulic system are exceptionally large, having a diameter of 20 inches and a face width of 6.5 inches.

Overhead Valves Continued

The Knox company has not departed from its overhead valve practice in bringing out this new tractor. The motor has its four 5 by 5.5 cylinders cast in pairs and is so timed as to have a quick acceleration to approximately 1,000 r.p.m. Beyond this point the speed horsepower curve shows a rapid decrease. This arrangement has been worked out on the theory that when running under full load the speed will be limited, because the maximum power necessary to carry the load cannot be obtained at speeds which will shorten the life of the tractor. When the tractor is run without load it may be driven at higher rates of speeds without damage and this condition is taken care of by the fact that a small power output only is necessary under these conditions. Thus, an automatic governing feature is provided which cannot be removed to suit the desires of an irresponsible operator for speeds above normal.

Although the overhead construction is used, valve cages have been eliminated and the valves are carried in detachable heads bolted to the cylinder castings. The principal change in the valve mechanism is in the use of ball bearings instead of plain bearings for the rocker arm. The valve mechanism is exposed and hence readily accessible. The auxiliaries are also mounted accessibly, being as high upon the motor as is practicable. This applies to the carbureter, magneto, generator and starting motor; the lowest point of any of which is 31 inches from the ground, thus allowing the tractor to pass through a considerable depth of water without allowing moisture to penetrate any of these instruments.



Top, left side of motor; bottom, right side of motor, showing mounting of carbureter, generator and linkage for overhead valves

Oiling Is Refined

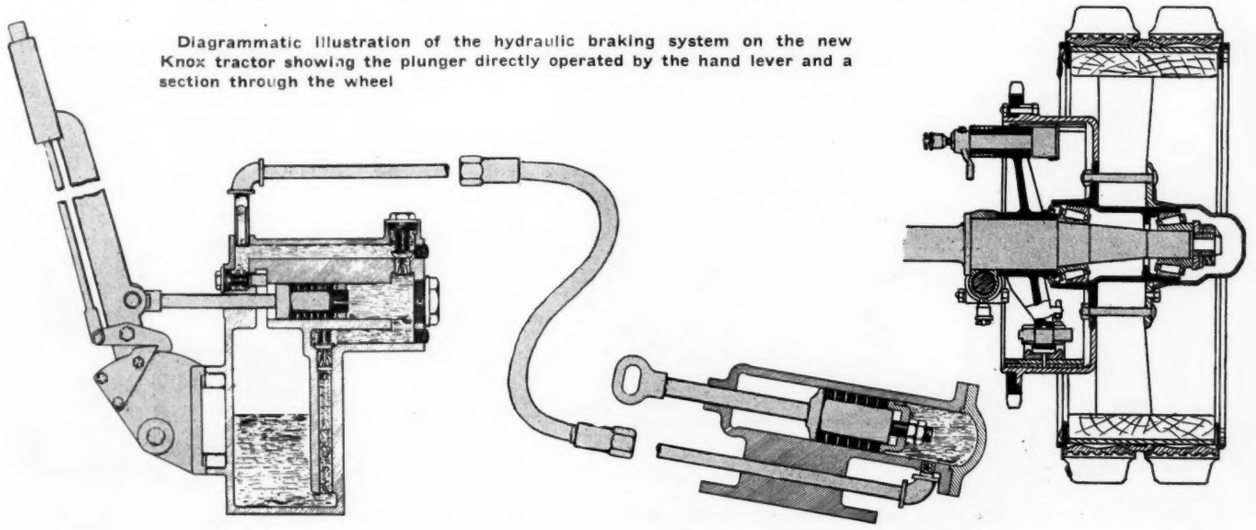
The oiling system has been considerably refined and is a high-pressure force feed scheme in which the main lead is a steel pipe cast within the crankcase and from which drilled holes communicate with all the bearing surfaces. There is a device which regulates the pressure on the oiling system, allowing surplus oil to be discharged into the timing gearcase, thus lubricating these gears. The oil pump hangs from the upper half of the crankcase and there is a large screen which entirely covers this and through which all the oil passing through the system must go before circulation. By removing six nuts the screen may be withdrawn for cleaning without disturbing any of the mechanism.

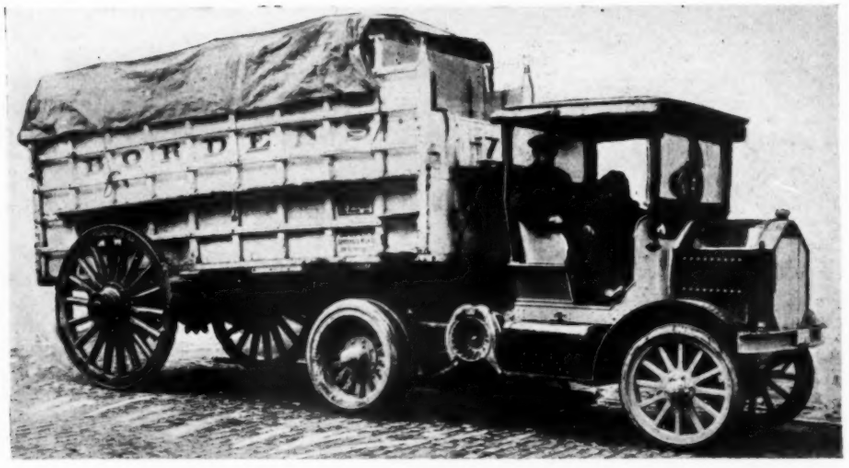
The electrical equipment of the car includes a Mea magneto, and a Bijur starting and lighting system. The Bijur generator and the Mea magneto are mounted on the same longitudinal shaft. The spark position is fixed. Starting engagement is secured by sliding a pinion mounted on the armature shaft of a cranking motor into engagement with the geared flywheel. The starting motor is carried on the crankcase.

Vacuum Fuel Feed

The fuel system includes a Stewart vacuum feed from a 25-gallon square tank located below the frames and behind the right running board. In this position it is accessible for filling, its weight is carried low and in a good position in

Diagrammatic illustration of the hydraulic braking system on the new Knox tractor showing the plunger directly operated by the hand lever and a section through the wheel





View of the complete vehicle, tractor and trailer, in active service with a heavy load of milk

relation to the center of gravity of the entire car; the load being kept off the back axle as much as possible. The small tank from which the fuel is fed by gravity to the carbureter is mounted behind the dash and is of such a height above the motor that a positive fuel feed is given on any practicable grade.

The cooling system is operated by a centrifugal pump, the water being taken through a U-shaped casting bolted to the side in such a manner that the water joint is eliminated when the head is bolted to the cylinder.

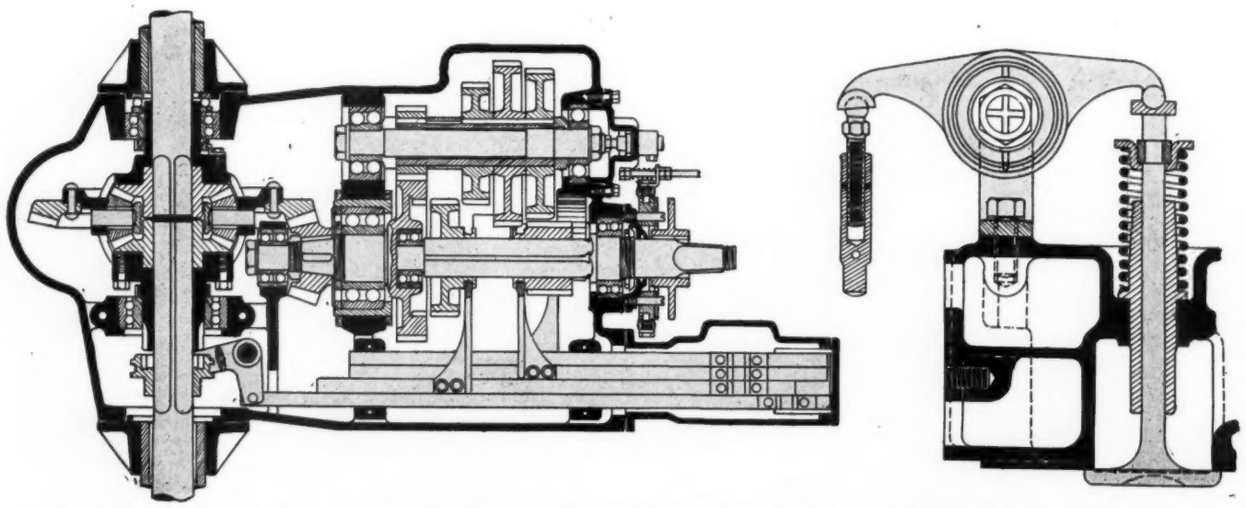
Clutch Is Larger

Cork inserts are used in the same design three-plate clutch as previously employed. The clutch is larger, however, in order to take care of the heavier loads and to furnish a positive engagement for the sudden efforts necessary in tractor work. The three-speed selective gearbox is incorporated with the jackshaft. It is provided with an interlocking differential lock incorporated in the gearbox and operated by a heel button at the driver's seat. The purpose of the interlocking device is to prevent the differential lock to be used except when the gears are in neutral. This has been done owing to the experience gained in previous locks in which brakage was caused by the engagement of the lock during the transmission of power through the gearset. The trouble has been caused by using the lock when one wheel is spinning at a high rate of speed while the other remains practically stationary. With this device, the spinning wheel is stopped before the lock can be engaged. The entire gearset is carried on double row annual ball bearing. The gears and shafts are nickel-steel and the gearcase is a barrel design with the aperture for the bearing bored through the case. The top of the gearcase is located between the two seats to the right of the driver, giving a convenient layout for the central control.

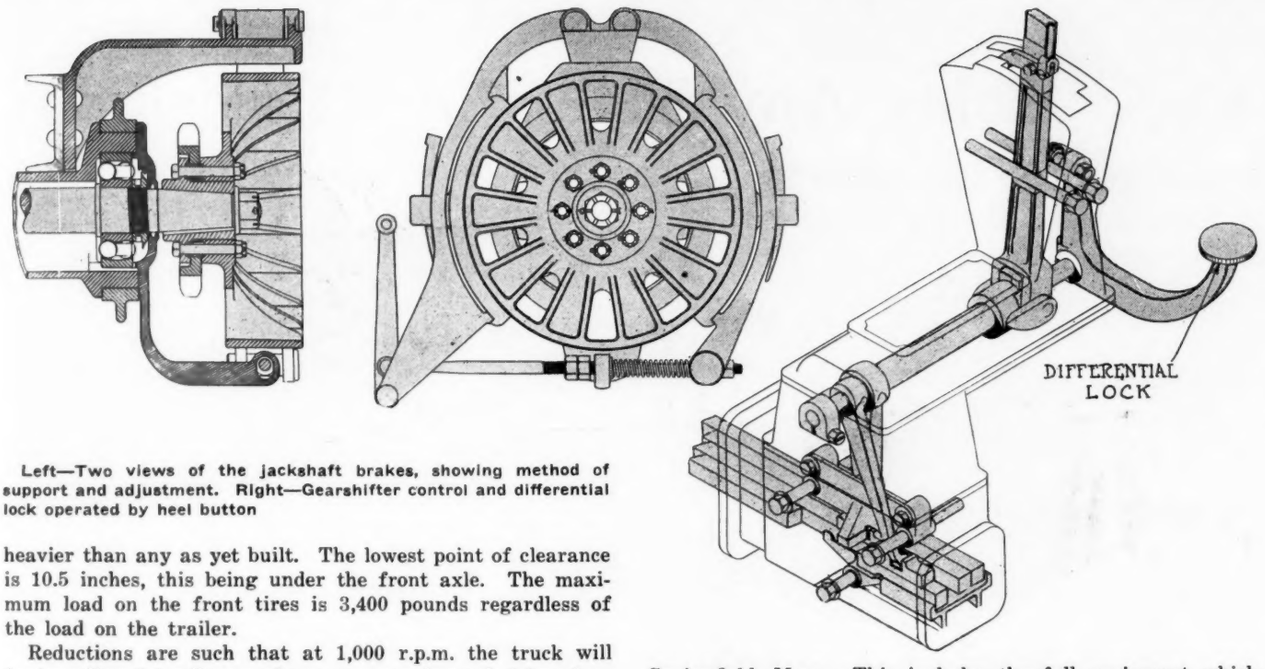
The drive of the tractor, including the power plant, front wheels and body is through the rear axle to the distance or strut rods, thus allowing the trailer to really become a part of the power-driven vehicle with a front-wheel drive. This is ideal for allowing the truck to climb over obstructions because it places most of the load on the driving wheels. The light load of the tractor which is pushed ahead of the driving wheels simply furnishes traction for steering effort.

Although the wheelbase is but 108.5 inches, the principles incorporated in the design of the tractor are entirely different from those in what may be termed a short-wheel base truck. This is due to the method of spring suspension which has previously been described. The chassis proper, including the transmission, motor, cab, etc., is carried on springs which are about 30 per cent. as stiff as those on the ordinary 5-ton truck. Thus the driver need not operate a vehicle which is, from his standpoint, practically without springs. As will be noted from the illustrations, the frame does not extend back as far as the rear axle and the rear axle is entirely separate from the chassis of the tractor.

From the jackshaft, the drive is taken through the rear wheel by chain in the usual manner, the rear axle being allowed to rise and fall in the arc provided by the rear bracket of the strut rods. A draw-bar device with springs is attached to maintain the trailer platform in a horizontal position when running without the trailer attached. The rear axle is a solid steel forging of rectangular 2.75 by 4.375-inch section and the entire vehicle is standard tread. The tires in front are 36 by 4 single, and in the rear 38 by 6 dual. The rear wheel construction is exceptionally heavy, and in fact the Knox company claims that it seems to be



Left—Gearshifting and differential locking mechanism in sectional view. Right—Sectional view of the ball bearing overhead valve operating mechanism



Left—Two views of the jackshaft brakes, showing method of support and adjustment. Right—Gearshifter control and differential lock operated by heel button

heavier than any as yet built. The lowest point of clearance is 10.5 inches, this being under the front axle. The maximum load on the front tires is 3,400 pounds regardless of the load on the trailer.

Reductions are such that at 1,000 r.p.m. the truck will be traveling 9.4 miles per hour, on second speed, 3.9 and on low speed 1.6 miles per hour. By changing the jackshaft sprocket and making other slight alterations the speed can be increased to 33 miles per hour for use for fire apparatus, wrecking purposes, etc.

The Hydraulic Brakes

The hydraulic rear wheel brakes are internal, being Raybestos-faced with 20 by 6.5-inch drums. The hydraulic cylinders are carried on the radius rods and are connected to the pump which supplies the hydraulic pressure upon the manipulation of the operating lever, by flexible tubing. The pump consists of the cylinder, fitted with a piston attached to the operating lever. As this is worked backward and forward, oil is forced through the cylinders and expands the brakes. The pump is self locking and has a latch in addition to guard against accidental release. The release of the pressure is effected by moving the lever to its extreme forward position which opens a by-pass, allowing the oil to return to the reservoir.

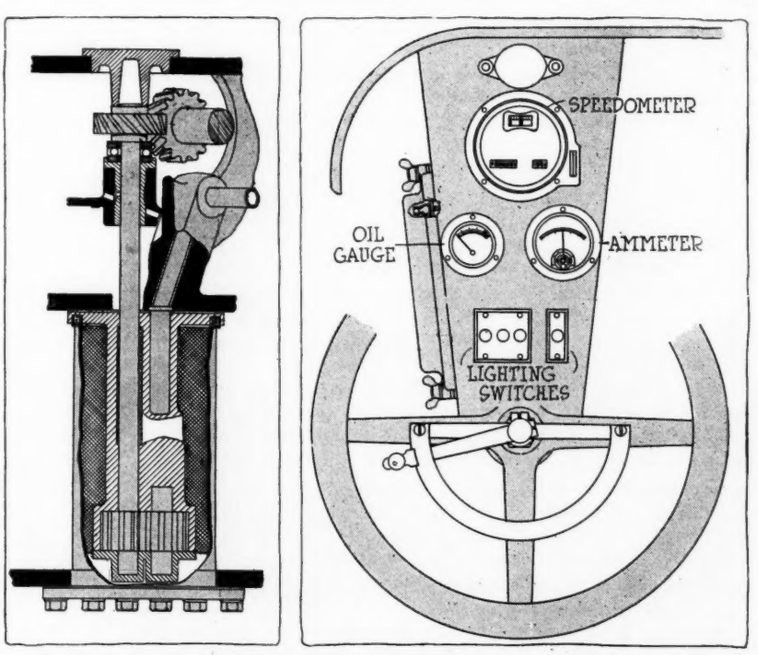
Foot Brake Can Be Locked

The car is generally stopped by one stroke of the piston or one movement of the hand brake, but when it is desired to apply more pressure, additional strokes may be made. Another feature which is unusual in brake construction is that the foot brake can be locked.

The equipment includes the trailer platform with its springs and circular plates, electric starting and lighting with a large searchlight, two heavy jacks for removing the trailer, fire extinguisher, speedometer, cab and side curtains, a hand-operated horn and all the standard tools and parts. The guarantee on this tractor is given for a year, instead of the usual 90 days, and no limits are placed upon the speed at which the motor may be driven.

The primary idea which is behind the marketing scheme for the new Knox tractor is exactly in line with the policy of the more advanced motor truck companies to sell service rather than trucks. The price of this tractor with standard equipment is $4,500 f.o.b. Springfield, Mass. This includes the full equipment which has been mentioned.

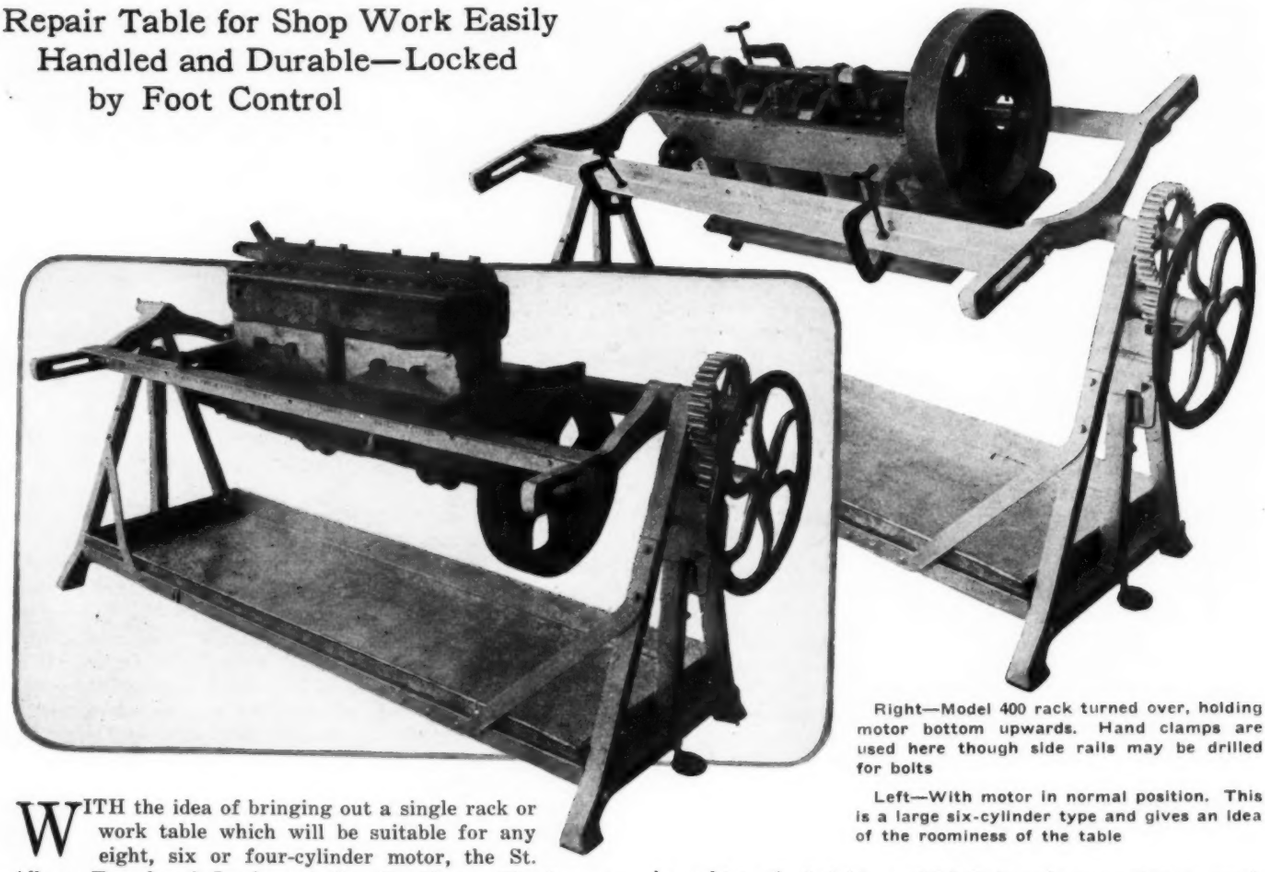
The claim of the manufacturer is that the tractor and trailer method is the most economical way of hauling very heavy goods and hence it is the object of this concern to bring the new trailer to the attention of lumbermen, coal dealers, brewers, contractors and other trades in which the hauling of heavy materials is involved. A complete set of data regarding the costs of various hauls as compared to the horse and motor trucks method has been compiled. The machine will be marketed through the company's seven established branch offices and through a corp of transportation engineers who have already been trained in this work or who will be educated by the Knox company. The company contemplates establishing a training school for this purpose.



Left—Oil pump mechanism with helical drive, showing strainer in position. Right—Control board mounted between the steering wheel and the dash, rendering all instruments accessible from driver's seat

Rack Holds Any Motor in 32 Positions

Repair Table for Shop Work Easily Handled and Durable—Locked by Foot Control



Right—Model 400 rack turned over, holding motor bottom upwards. Hand clamps are used here though side rails may be drilled for bolts

Left—With motor in normal position. This is a large six-cylinder type and gives an idea of the roominess of the table

WITH the idea of bringing out a single rack or work table which will be suitable for any eight, six or four-cylinder motor, the St. Albans Foundry & Implement Co., St. Albans, Vt., has announced an adjustable device which incorporates many features unique in this field.

This table is intended for a universal machine. It can not only handle any size motor but is so arranged as to be able to support any of these motors in any desired position. The device can be placed close beside the car and the motor lifted from it and swung into position into the rack with the ordinary type of chain hoist. It is possible to lock the work table in thirty-two different positions. The locking device is operated by the foot, permitting the free use of the hand during the revolving of the engine. The table itself revolves easily; and with it a heavy engine may be adjusted to any position with one hand operating the hand wheel. This is accomplished by the reduction gears shown in the accompanying illustration.

This machine is constructed entirely of iron and steel and can withstand the wear and tear of ordinary service. In the illustrations the table is shown with the motor mounted in upright and reversed positions. The side rails, which are removable, can be extended to take care of wider engines and for narrow engines there are supplementary rails inside the main frame. The side rails are angle steel 1.5 by 2.5 by .25-inch. Generally the engines are fastened to the table by hand clamps, but if it is desired the side rails can be drilled to take the ordinary engine bolts.

The length of this table overall is 7 feet. This is sufficiently great to take care of the ordinary motor and flywheel attachments. The height is 3 feet, giving a firm base with little danger of tipping. At the same time the motor is brought to the height at which it is most convenient to work upon. The width is 3 feet overall, the table being 17 inches wide with the side rails contracted and 10 1-2 inches wide using the extra rails. The width of the table with the side rails extended is 30 inches and when extended with the interior extra rails a 27 1-2-inch width is given. The table length is 64 inches. The diameter of the hand wheel is 17 inches. The weight of the entire table completely assembled is 325 pounds. When the pan is removed it is 310 pounds. In the normal position, the table is 30 inches above the ground. When it is reversed it is 37 inches.

In addition to this the St. Albans company manufactures three other models of tables known as the 100, 200, and 300. The largest table just described is known as model 400. The dimensions of the other tables are as follows:

Table Model	Length, Inches	Minimum Width, Inches	Maximum Width, Inches
100	30	10	24
200	40	10	24
300*	54	10.5	30

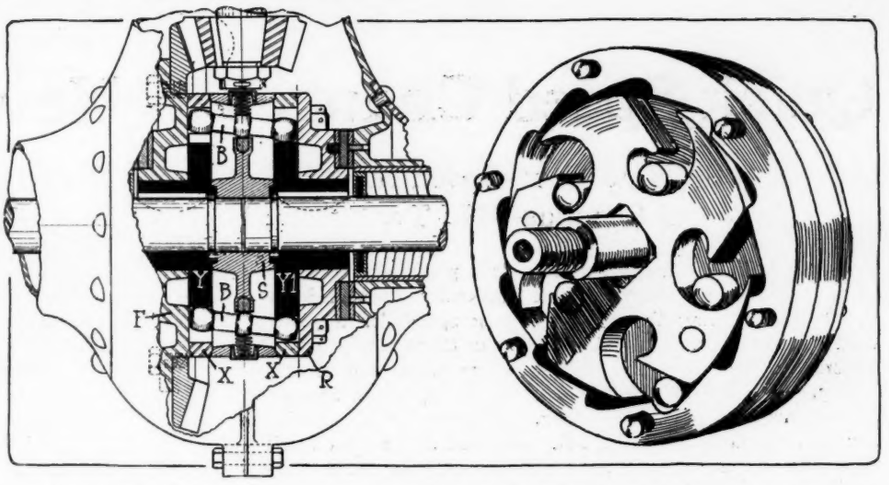
*Extra side rails furnished with this machine.

Gearless Differential Co. Adds a Type for Ford Cars

THE Gearless Differential Co., Detroit, is still making its form of releasing clutch which is designed to take the place of the conventional gear differential. In addition to this type, a design for Ford cars has been brought out which can be fitted to the Ford axle without alteration of the Ford

mechanism, the compensating gears, however, giving way to special ratchets which are a part of the Gearless assembly.

Fig. 1 shows sectionally the device installed in the Ford axle. In this form it acts on the same principle as the standard type. The left differential flange F to which the differential driving gear is bolted, the right hand flange R, the center ring S and the right and left driving sectors X—two at top and two at bottom—are bolted together, making the whole outer differential housing a unit. The right and left ratchets YY_1 which are keyed to their respective axle shafts are free to rotate inside the housing. The round members B are the interlocking mediums between the driving sectors and the ratchets. In the illustration the right hand end of the top pawl is in the tooth of the right hand ratchet and is being driven by the contact face of the driving sector. In the same manner the left ratchet is driven forward by the lower pawl which is engaged at the opposite end. Thus both wheels are being positively driven forward.



Gearless differential for Fords. Left—Fig. 1—Section showing how drive is carried from one side of axle to the other on pins B. Right—Fig. 2—Gearless differential in its original form, as designed for use on small cars and trucks

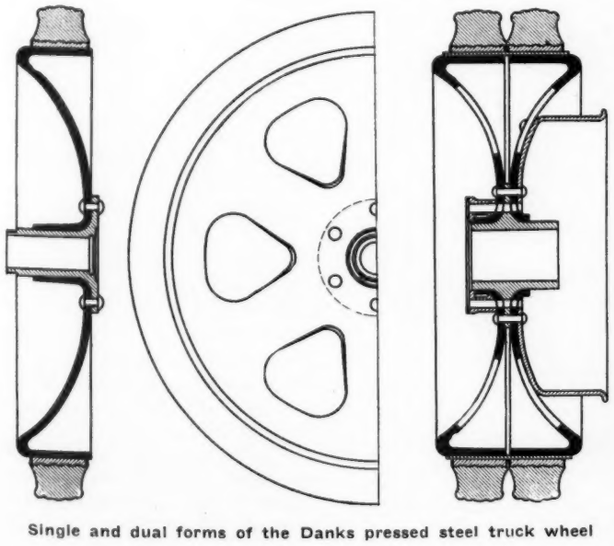
To drive backwards, the differential housing starts to move to the left and pushes the end of the pawl out of the ratchet tooth. This throws the opposite end of the pawl down into the tooth of the opposite ratchet. The lower pawl acts similarly and the rotation is reversed. Imagine the car to be turning a corner to the left. The right wheel revolves faster than the left and causes the right hand ratchet to move faster than the differential housing, which can only go as fast as the inner or slower-moving wheel. The ratchet pushes the end of its pawl out of its tooth, thus allowing the ratchet to have a free movement forward. As soon as the wheels revolve again at the same speed, the spring at the center of the pawl pushes its end back into engagement and the drive is again taken up by both wheels.

The standard form is the same in operative principle as the Ford type, only instead of the walking beam form of pawls, rollers form the connection between the driving member and the driven one. Fig. 2 shows the design. The inner driving member is fixed to the shaft, and its pawl cams pick up the rollers when the rotation is reversed. These are carried towards the center of the runways by their own inertia. A similar set of parts on the opposite side take care of rotation in the opposite direction.

An English Pressed Steel Truck Wheel

A NEW pressed steel wheel for commercial vehicles is announced in the current issue of *The Automobile Engineer*. It is designed to cope with the difficulty produced by the failure of Continental supplies of steel wheels.

The single wheel is shown at the left in the illustration, and it is manufactured in the following manner. A steel plate is placed between a pair of blanking dies, and a circular disk is punched out of it. This disk is heated and placed between a pair of forming dies that press it into the formation shown in the illustration. It is then shrunk upon the hub, which is a drop-forging, and, after the holes are drilled, is riveted to it.



Single and dual forms of the Danks pressed steel truck wheel

The double wheel consists in reality of two-single wheel disks shrunk upon a drop-forged hub and no welding is necessary.

At the right of the illustration may be seen a double or rear wheel complete with brake drum and special boss—as supplied to a well-known firm of commercial vehicle builders—the latter being required to suit the special demands of the customers. For vehicles up to 2 tons capacity the rear wheel disks are pressed from 3-8-inch steel plates, and for those above this size a 1-2-inch plate is utilized, while the front wheels are in all cases composed of 1-2 inch steel plate, and in all instances the wheels are lightened by the perforating of the disks in several places, as shown.

Important features of the construction lie in the fact that the natural contracting forces, consequent upon the cooling of the heated parts, are utilized in bonding together the component parts of the wheel, and that welding together of parts, as is frequently employed in other makes of wheels, is avoided entirely while the use of rivets is only necessary for holding the disks in contact with the flanges of the hubs. Messrs. Danks & Co., Oldbury Boiler Works, Birmingham, Eng., the maker, places emphasis on the simplicity and strength of the construction.

Quick Speed Changes in New Drill Press

New Four-Speed Machine Reduces Speed Changes to 2 Seconds—No Twists to Shorten Life of Driving Belt

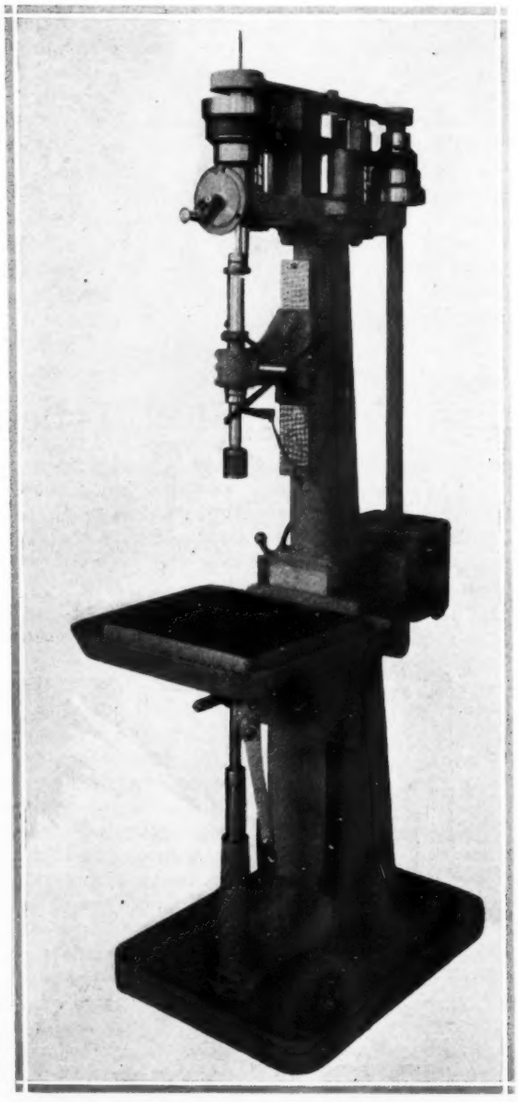
A NEW quick-change sensitive drill press which is designed to cut the time generally consumed in determining the proper cutting speed for a given drill size has been brought out by the Sipp Machine Co., Paterson, N. J. It is also intended to reduce to a minimum the question of belt arrangement by having these applied in the simplest possible manner. It is stated that, with a number of sensitive drills, belts are used that do not track naturally and hence it is generally necessary to use a number of twists and turns in the belting which generally shorten the life of the belt and result in the belt being stretched more on one side than on the other. This unequal strain destroys the fiber of the belt and results in increased slippage and after a length of time in breakage.

Another trouble which the new drill is intended to eliminate is that of the sometimes unsatisfactory hand screw device for operating the pulley centers in order to secure the proper attention on the belt. When inexperienced operators make this adjustment the centers are often determined in an unsatisfactory manner and much more strain is put on the belt than need be, with a consequent breakage of the belt transmission. While the wage of the operator continues during the time that the belt is being repaired, it must be remembered that both the machine and operator are non-producers during this period. To overcome the difficulties mentioned above the Sipp drill uses an open endless belt tracking without any twists or turns and at the same time has the centers automatically determined, thus taking up the slack and stretch of the belt. The short, straight, endless belt used on this machine can be placed in position in 10 seconds, according to the manufacturer. Belt tension is kept constant by idler pulleys on the slack side.

Speed Change in 2 Seconds

It is stated that with this new drill any speed change can be made in 2 seconds. This is a vast reduction over the length of time required with the ordinary sensitive drill. For convenience in making these speed changes and for securing the proper cutting speeds a dial showing the r.p.m., or size of drill, is conveniently placed facing the operator. The belt is shifted by a crank handle which renders it not only safe to make the speed changes but renders it possible to do this safely.

The construction of the spindle is of note in that provisions have been made for long bearing surface and good oiling. The feed pinion bearing is of exceptional length and is lubricated by a new spindle oiling device. Great rigidity is obtained by the use of a long steel feather on the spindle feed. When lifted to its extreme height the spindle chuck is 32.5 inches above the table, when this is in its highest position. Another feature of this machine is that it need only be bolted to the floor and the floor need not be bored since telescopic screws are used on the table elevating shaft. A groove about the table facilitates the removing of chips.



Exterior of the new quick-change speed sensitive drill press made by the Sipp Machine Co.

Better Cutting Speeds

It is thought that with the ease in making speed changes more efficient cutting speeds will be commonly used. All these changes and the changing of the drills themselves can be made without stopping the machine. The operator need not leave his natural working position either for changing speeds or drills, or for the purpose of raising or lowering the table.

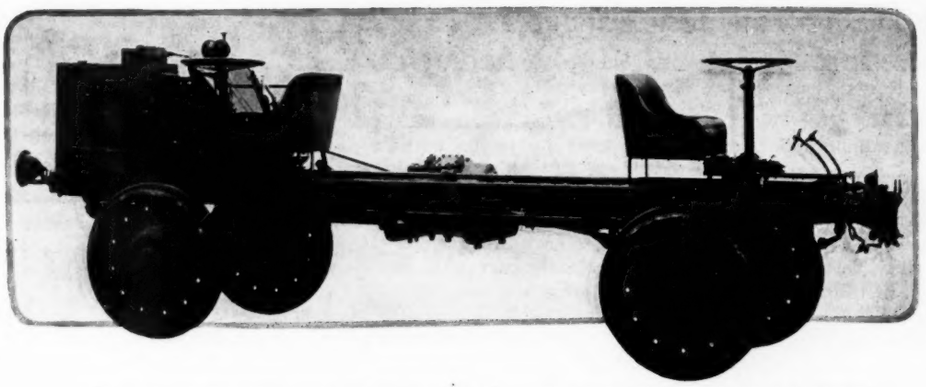
These drills are built in various combinations from one to eight spindles inclusive. The machines have four speed changes arranged for either carbon or high speed drills. The power and speed variations are sufficient to handle high speed drills from the smallest up to 29-32 inch diameter. The use of non-friction bearings has been generous in this machine, sixteen of these being employed in a one-spindle drill. The entire belt strain of the spindle driving cone is taken on ball bearings and no strain whatever is placed upon the spindle.

Throughout the entire design of the drill Safety First requirements have been carefully noted. The belt shipper is so designed as to prevent the fingers from getting caught between the belt and the pulleys, and, although the safety requirements have been met throughout, no unsightly guards or coverings need be used.

Jeffery Reversible Army Truck

JEFFERY has brought out the first reversible military truck to be constructed in America. It is a 2-ton, four-wheel drive chassis and the first model is to be shipped to London to be demonstrated to the military officials of the Allies.

This chassis is one of three of its type built by the Thomas B. Jeffery Co., Kenosha, Wis., in response to the recommendations of W. F. Bradley, as published in THE AUTOMOBILE for December 17, page 1101. These recommendations require the car to be run in either direction at equal speeds so that it is possible for the vehicle to be removed from a cul de sac.



Jeffery reversible army truck which can be driven 35 miles per hour in either direction

The new vehicle as shown in the accompanying illustration is a stock Jeffery 2-ton, four-wheel drive with four wheel steering and braking, but has a steersman's seat at either end. The engine is guarded by a light steel plate at the rear and the starting crank is mounted behind it, being connected with a chain and sprocket to the crankshaft, and for safety's sake an overrunning clutch is fitted. Should a quick start be desired, there is a Bijur electric starter. The gearset is reversible, having four speeds in either direction. The reverse gear has been removed from the stock gearset and a fourth speed substituted. The reverse is independent.

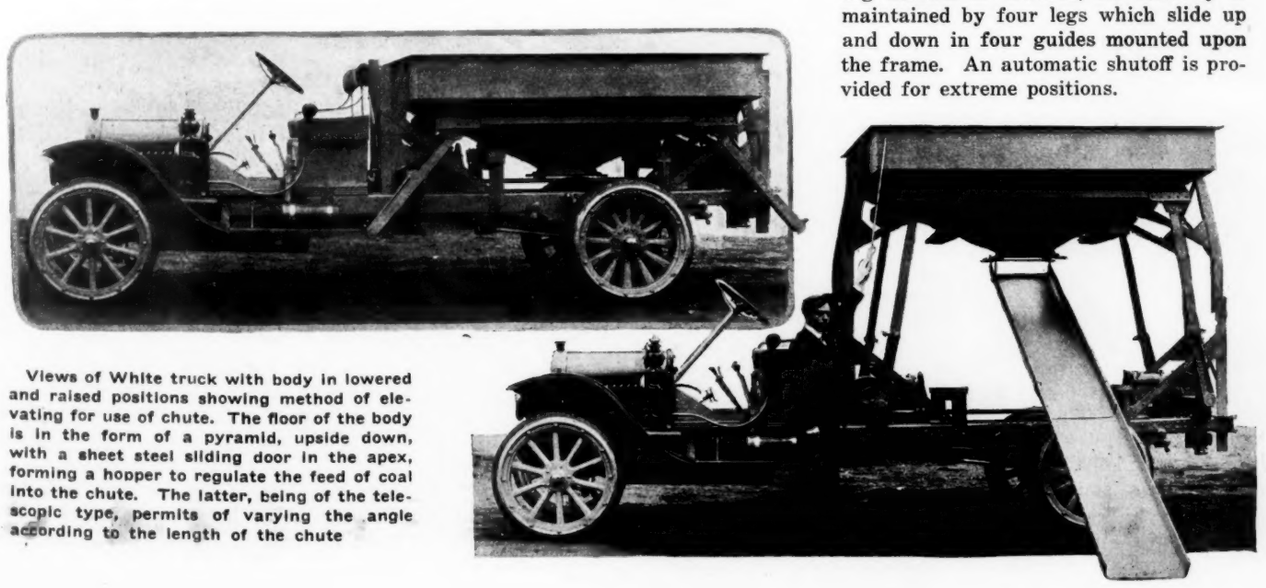
The steering wheels at the front and rear ends of the truck are interconnected, as are also the clutch and brake pedals. In military service there would be two operators in communication with one another by means of electric buzzers. Three cars of this design have so far been built. One is in New York City, another at San Francisco and the third in Kenosha. Speed in either direction is 35 m.p.h.

White Power-Hoisting Coal Body

A NEW type of power hoisting body on a special 1.5-ton truck for the retail delivery of coal has been introduced by the White Co., Cleveland, O. This new truck utilizes the principle of four worm-operated lever arms in the elevating mechanism. It is notable in that it is an application of the power hoisting principle to the fast moving, medium-duty coal truck. It is designed especially for the rapid discharge of coal directly into manholes, basement windows, etc.

The truck is capable of hoisting the 72-cubic-foot body in 30 seconds, and has been so designed that a chute on either side of the truck may be used. It is thus possible to deliver the coal into a sidewalk manhole without violating traffic ordinances.

Two lever arms in the front and two in the rear are attached to the ends of transverse shafts which are turned by worms and gears. The worms are driven by sprocket and chain from a longitudinal shaft and this in turn is driven by the power transmission of the truck. When the body is being hoisted or lowered, its stability is maintained by four legs which slide up and down in four guides mounted upon the frame. An automatic shutoff is provided for extreme positions.



Views of White truck with body in lowered and raised positions showing method of elevating for use of chute. The floor of the body is in the form of a pyramid, upside down, with a sheet steel sliding door in the apex, forming a hopper to regulate the feed of coal into the chute. The latter, being of the telescopic type, permits of varying the angle according to the length of the chute

3,500 Cars for Central New York This Year

$5,000,000 Business Expected—75 Per Cent. Increase Over 1914, When 2,000 Cars Were Sold

SYRACUSE, N. Y., March 1—Five million dollars of business in automobiles and allied products is anticipated for the coming season in the territory which is fed by the automobile dealers and distributors of this city, who staged their seventh annual show last week in the State Armory. A compilation of statistics obtained from the exhibitors shows that they expect to sell 3,500 cars this year in this territory as compared with less than 2,000 last year, an increase of 75 per cent. All of them are keenly optimistic.

So successful was the show from the standpoint of attendance and business that it is to run 6 days next year; this year it ran from Tuesday night to Saturday night, 5 days. The first show, 7 years ago, was 3 days.

This year 21,000 people attended and about 600 of them were dealers and salesmen of automobiles and accessories in the comparatively large territory which uses this city as a distributing center.

The Syracuse show is the main motoring event in Central New York. March 3-6 Watertown holds a show in the State Armory in that city and the week following Utica has an exhibition, but the Salt City event is the largest.

Many and Varied Industries

The Syracuse territory,—which embraces as a general rule ten counties but sometimes several more—possesses a large buying power. The cities are industrial, the manufactures are many and varied and the lines of agriculture are also of great variety. This variety and prevalence of small industries tends to preserve an evenness of conditions which does not obtain in those cities where industrial health is dependent upon one or two large factories.

In the cities of this section, which are Syracuse, Binghamton, Auburn, Rome, Oswego, Watertown, Fulton, Cortland, Ogdensburg, Ithaca and also Utica and Binghamton in some cases, there are 2,000 factories with an annual output of better than $150,000,000. There are in ten counties 7,000,000 acres divided into 50,000 farms, averaging 133 acres to the farm. The total value of the farms and farm property is $300,000,000, and this does not include the farmers' resources aside from the land, buildings and equipment. Crops and bankrolls are not counted.

One of the features of this year's show was the used car exhibit, in which twenty-six well-finished used vehicles were housed by themselves in the basement of the State Armory. This display was as carefully as the new car exhibits on the upper floor. Each car carried a placard giving the name and year of the car and, in some cases, the price.

The exhibit housed sixty exhibitors, who displayed a total of ninety new cars and chassis, eighteen trucks and twenty-six used cars, 134 in all. But seven were closed cars. Some of the dealers planned to include closed cars but did not receive them in time. Anyway, the closed car trade in this city has not progressed as rapidly as in some other cities. The Syracuse car owner seems content with a touring car, and most owners drive their own cars.

3,000 Cars in Syracuse

There are 3,000 cars running in this city and about 40 per cent. of them run all winter. Curtains serve to keep out most of the wintry blasts and that suffices. The mean temperature during the winter seldom gets far below the freezing point and the streets are at all times fairly passable. In the territory to the north, south, east and west cars are kept running wherever the roads are in any fit condition. One owner is reported to have driven recently from his home to town over the crusted tops of snowdrifts without difficulty. In the territory east of Oswego along Lake Ontario one dealer stated that there generally are not more than 60 days that cars cannot be kept in service. The general report is that in the country districts cars are driven if there is a semblance of a road open.

Population of Cities in Syracuse Territory

City	Population	City	Population
Auburn	34,668	Utica	74,419
Binghamton	48,443	Fulton	10,480
Elmira	37,176	Oswego	23,368
Syracuse	137,249	Ogdensburg	15,933
Watertown	26,730	Ithaca	14,802
Cortland	11,504		
Oneida	8,317	Total	463,586
Rome	20,497		

Factory Activities

Several factories and branches had representatives at the show laying plans for 1915 business. C. H. McCausland of the New York Kissel branch rented space, displayed cars and placed an agency; Frederick E. McEwen, territorial representative, displayed the Inter-State and placed the Syracuse dealership with the Service Boat & Engine Co., E. L. Rolfsen, proprietor; the White was represented by R. R. Stitt, Syracuse, R. H. Shimer, Utica, and Newell Lyon, New York State manager; the International Harvester Co. was represented by Maurice Stanton and S. W. Wyman, territorial managers; the Case exhibit was staged by the Syracuse branch, F. L. Allen, manager, which caters to 149 dealers.

Factory exhibits were staged by the Chase Motor Truck Co., Syracuse; the Sanford Motor Truck Co., Syracuse; H. A. Moyer & Co., Syracuse; the Palmer-Moore Co., Syracuse; and the Brockway Motor Truck Co., Cortland. The Franklin Automobile Co. was represented by Bull & Young, the Syracuse dealers. W. T. Butler, Indianapolis, and E. H. Baker, president of the Cole Motor Car Co. of Buffalo, placed the Cole agency with Nichols, Nichols & Nichols.

Farm Property in Ten Counties of the Syracuse Territory

County	Population	Acreage	Farms No. of	Acreage Average	Value of All Farm Property
St. Lawrence	89,005	1,728,640	8,244	129.1	$49,975,175
Jefferson	80,382	815,360	5,778	126.8	40,095,331
Oswego	71,664	618,240	6,319	77.9	23,804,151
Lewis	24,849	812,800	3,343	142.1	16,288,674
Oneida	154,157	800,000	6,929	99.6	38,437,991
Madison	39,289	416,000	4,042	94.4	20,891,990
Onondaga	200,298	499,840	5,770	75.8	37,291,043
Cayuga	67,106	449,920	4,785	85.9	26,915,448
Cortland	29,249	321,920	2,610	114.8	13,171,013
Tompkins	33,647	304,640	2,988	91.4	14,898,795
Total	789,646	6,767,360	50,808	133	$281,769,611

Farmers of Northern Iowa Will Spend $2,500,000 on Cars in 1915

FORT DODGE, IA., March 1—The fourth annual northern Iowa show which ended here Saturday night surpassed any other similar event in this section of the state, produced more business than any larger shows, and, attracted close to 25,000 people from a radius of 100 miles. Dealers are enthusiastic over the results obtained.

In the heart of the only section in the country where business has been good for the past few months, according to a

recent map United States Chamber of Commerce, Fort Dodge is the center of a section where people have money to spend for automobiles. Seventy-five per cent. of sales go to farmers. Local distributors handled $2,000,000 worth of cars in 1914, and expect a 25 per cent. increase this year. Thirty counties in the prosperity belt handled out of this city. Five hundred and fifty subagents working under distributors last year sold 2,500 cars and expect to sell 3,000 this season, and twenty-eight makes of machines are represented here. Fort Dodge now is recognized as logical center for automobile distribution in northern Iowa. Four hundred and sixty-four subagents registered at the show.

From a sales standpoint the show was a success. Few notes were offered and most of the buyers paid cash. Accessory men reported more sales than at the Kansas City or Omaha shows.

The fifty-sixth regiment armory proved entirely too small and the show association was forced to turn down twelve requests for automobile space with a total of fifty cars. As a result dealers are behind the movement to build a coliseum at least three times size of the armory. With the prices of farm produce increasing because of the war, northern Iowa will have big business from the farmers this year. Land is increasing constantly in value and farmers are prosperous.

$4,116,000 Sales Predicted for New Haven Territory in 1915

NEW HAVEN, CONN., March 1—In the territory centering around this city, cars were sold last year to the value of $2,796,000 and for the current year, conservative estimates place the total volume of sales at approximately $4,116,000. Although these amounts may seem small by comparison with the totals that are piled up by such great distributing centers as Kansas City, Omaha and Minneapolis, where the dealers have hundreds of thousands of square miles of territory to draw from, it must be remembered that the territory which is covered by New Haven dealers is almost microscopic by comparison.

A Market of 1,037,000 Persons

The average New Haven dealer calls as his territory an area which does not exceed 1,500 square miles. In this territory, there is a possibility that he may sell to 1,037,000 persons. This is made up of New Haven county, Fairfield county and Middlesex county, the respective population figures being 337,000, 45,637 and 245,352. But not every dealer has these three counties in which to sell cars. Only the larger dealers can place their agents in these counties adjoining New Haven. The smaller dealers must be content with New Haven county including the city of New Haven with a population of 144,500 and perhaps a small part of Fairfield and Middlesex counties. In some few instances, the larger dealers have the whole of the State of Connecticut for territory.

As a matter of fact, most dealers concentrate their selling efforts on New Haven itself, few of them having more than three or four sub-dealers in other cities in their territory. That there is room for considerable expansion in this respect, is generally admitted, and the reason for the lack of expansion is given as being the inherent caution of the New England dealer in making business connections. In the majority of cases, the dealer insists on the most rigid examination of the credentials and business ability of those he appoints as his subdealers.

The Used-Car Problem

As is the case in so many other cities throughout the country, the used car problem looms rather large to the New Haven dealers, though the proximity of New York has relieved matters somewhat by providing an outlet. Latterly, however, the atmosphere has been considerably clarified by the action of the New Haven Automobile Trades Assn. which has subscribed for the Used Car Central Market Report of the Chicago Automobile Trade Assn. for its members. This has operated to stabilize used-car values and the report is quite generally referred to when a used car is offered in trade or for sale. It is the concensus of opinion, however, that the "as is" values as given in the report are slightly too high for New Haven and for this reason the practice of subtracting about $50 from the value given in the book is gaining. This permits the dealer who takes in the used car a margin upon which to work in order to cover overhead and such minor repairs and adjustments that may be necessary.

Electric Cars Gain

Although the demand for electric cars is small in this particular territory, it is steadily increasing. There are at present approximately seventy-five electric passenger and commercial vehicles in the city of New Haven and the two dealers in electrics are optimistic for the future because of the absence of hills in the city, the comparative cheapness of current and the excellent roads in the surrounding territory. Road improvement has made it possible for the electric tourist to make such trips as to Meriden, Bridgeport or Waterbury quite easily and this, it is pointed out, will have a stimulating effect. During the year gone by the Detroit agency distributed about sixty cars, and this it is expected will be increased to seventy-five for the present year.

The annual show, which is held in the armory, and which was brought to a close on Saturday night, is almost exclusively a retail show, the appointment of sub-dealers being the exception rather than the rule. Contrary to the usual practice, members of the dealers' association, with one or two exceptions did not exhibit at the show last week, there being a general feeling that a show at this time of the year was not exactly desirable particularly in view of the fact that the Bridgeport and Hartford shows had just been brought to a close. Nevertheless, the show was well attended, though the crowd was slow to arrive.

Lehigh Valley's First Show Indicates Growing Sales

SOUTH BETHLEHEM, PA., March 1—The Bethlehems and surrounding towns gave enthusiastic endorsement and support to the First Annual Lehigh Valley Automobile Show which opened here in the Coliseum on Monday and closed Saturday. The show, a paying proposition from the start, was open every afternoon and night from 1 to 11 o'clock.

The exhibition was a representative one in every respect, seventy-one cars being on view divided among fifty-seven dealers. Thirty-two different makes of pleasure cars, seven makes of trucks and six firms displaying many new accessories and devices applicable to the occupied space.

The daily attendance averaged between 1,000 and 1,100. Opening day being Washington's Birthday, and a holiday to many in this region, the attendance was doubled, as it was today, the last day; when 2,000 visitors were present.

The Automobile

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T. B. Van Alstyne, Advertising Manager
231-241 West 39th Street, New York City

EDITORIAL
David Beecroft, Directing Editor
Donald McLeod Lay A. Ludlow Clayden
J. Edward Schipper Sydney Oxberry
L. V. Spencer, Special Representative, Detroit

BRANCH OFFICES
Chicago—910 South Michigan Avenue, Phone Harrison 7707
Detroit—95 Fort St., West, Phone Main 1351
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10 Per Cent. Motorists

NEARLY 2 per cent. of the population of New England are motorists, or rather, a far larger proportion must use automobiles every day since 2 per cent. of New England's inhabitants are owners of automobiles. Suppose that each of these owners has as few as five people who constantly use his car and we see that 10 per cent. of the people of New England are habitual motorists. Now, we must remember that in taking census returns we include people of all ages, and that if we could figure the very old and the very young we should have a much smaller population who could possibly be habitual motorists, and it results in the surprising thought that something like one-fifth of the adult inhabitants of the six States, Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont, are regular automobile travelers.

Of course, this is guessing, insofar as the number of people who ride in each car is concerned, but to reckon five passengers as an all the year round average is conservative estimation. A man does not always have the same companions, in fact most automobile owners delight in making motoring enthusiasts of as many friends as possible, so one might even hazard the thought that a very great many more than one-fifth of the New Englanders have a practical appreciation of modern road travel.

If we study the rate of increase in the number of cars we see that it is far more rapid than the growth of population, and that the total number of automobiles in New England today is very large indeed, so large in fact, that it could absorb the outputs of more than one good-sized factory. Often hearing of outputs of many thousand cars a year creates a wonder as to what becomes of them all. Figures such as those relating to New England provide the answer that the day is at hand when more of us are motorists than not, and a wonderfully large number of us can find the means to buy and use automobiles

Defined Service

THE 50-hour free service card that is becoming more general with dealers in many cities is doing a good work for the disturbing free-service problem. It is something definite, tangible. You can see it. It is something more than a promise, a promise which may or may not be made good. The buyer has something he can put in his pocket, can look at; something in black and white, something with a few signatures attached, finally something that he has confidence in. It is something more reliable than the promise of commission salesmen, something that has a standard value 6 months hence or a year, if not consumed by that date.

Where in use the 50-hour free-service card is getting away from complaints, of owners, who tell of promises to keep the automobile running in good shape for a year or perhaps longer. This abuse with the floater type of commission salesman has attained alarming proportions in some cities. The card is already having its effect in tending to partially stamp out this evil. Anything that will tend to make the sale of automobiles more of a business proposition, and less of a matter of promise to keep a good car running all its life, should be encouraged by makers, distributors and dealers.

Research

THE preliminary report of the gasoline-electric research committee of the Metroplitan section of the Society of Automobile Engineers covers enough ground to show that these committees can be of great benefit to the industry. A great step forward has been made when a committee of this nature has successfully classified the subject of which it is making a study. That this has been done is amply shown by the manner in which the report has been received by the Metropolitan section.

Sufficient data have been disclosed in the preliminary report of this committee to make certain the fact that in the final report a sufficient store of information will be provided to make it of great value to inventors who are working along similar lines. The broad lesson drawn from this work is that it is possible for small units of the total membership of the S.A.E. sections to accomplish work which will not only be of value to the Society as a whole but to the industry at large.

Two New Fuel Processes Discovered

Dr. Rittman, Chemical Engineer of Bureau of Mines, Has Means of Increasing Independent Gasoline Output 200 Per Cent. and of Making Benzol from Crude Petroleum

NEW YORK CITY, Feb. 28—Two important chemical processes affecting the motor car industry have been discovered by Dr. Walter E. Rittman, chemical engineer of the Bureau of Mines. One is a new method of producing gasoline and the other the manufacture of tuluol and benzol, the latter of which can also be used as a motor fuel.

Dr. Rittman plans to end the Standard Oil Co.'s monopoly by dedicating his patent to the whole American people so that the small refiner as well as the trust can avail himself of a cheap process for manufacturing crude oil into gasoline. Heretofore the Standard Oil Co. has had an advantage because it had the most money, could employ the best chemists and therefore had the best processes for obtaining gasoline from the crude oil.

The first of these processes promises to enable independent refiners in this country to increase their output of gasoline from petroleum 200 per cent. or more. With an estimated production by the independent refiners of 12,000,000 barrels yearly, this will mean an output of 36,000,000 from the independents alone.

The second process enables benzol and tuluol to be made from crude petroleum, two products which heretofore could only be obtained from coal tar residues. Benzol is also a good fuel and is used extensively in Europe. However, it is planned to use these two substances for the production of explosives and dye-stuffs.

These processes are fraught with the utmost importance to the people of this country because for some time the Standard Oil Co., through the large amount of money at its command, has employed expert chemists and has thus had a big advantage over the independents in the production of gasoline. It has a patented process by which it obtains three times the quantity of gasoline from a given quantity of petroleum that the independents now obtain. There are two or three other large corporations that have an efficient process for the manufacture of gasoline, but the independents as a whole have never been able to even aproach the results obtained by the Standard Oil Co. Now the federal government, through the efforts of Dr. Rittman, proposes to make free for the use of all the people of the country a process that yields gasoline from crude petroleum in three times the quantity heretofore obtained.

Simpler, Safer and More Economical

It is claimed by Dr. Rittman that his process is simpler, safer, and is more economical in time than the processes now in use and these economic factors are of great importance.

An interview with a Standard Oil official showed that this company has not taken the announcement of the new fuel seriously, although it is admitted that nothing is known of Dr. Rittman's discoveries. The company took the attitude that if the patents were given to the public it would be able to use them as well as anyone else; but it did not explain that in this case it would only be on an equal footing with the independent companies.

The Standard Oil Co. also pointed out that benzol and tuluol can be produced from very few crude oils; and that millions of pounds of coal tar products are yearly burned under coke ovens, and that these products could be utilized in producing benzol and tuluol if it were not cheaper to buy them from Germanyq. No allowance, however, was made for the fact that Dr. Rittman's new method might reduce the cost of manufacture so low that it would be cheaper to make these products than to import them.

Full details of Dr. Rittman's new chemical process for increasing the supply of gasoline through his new formula will be made public by the Department of the Interior late in March. Dr. Rittman today said that in his process all of the oil is vaporized.

The Rittman process, it is understood, will work on all oil residue. Dr. Rittman made it plain that he had a profound respect for the Burton process, this being recognized as the leading practice today in the production of gasoline.

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Warns of Gasoline Famine—To Use Alcohol

MILWAUKEE, WIS., Feb. 27—F. W. Kressman, of the official staff of the United States forest products laboratory at Madison, Wis., sounded a warning with regard to the rapidly dwindling supply of gasoline in an address on Some Chemical Problems of the Forest Products Laboratory before a special meeting of the Milwaukee Engineers' Society under auspices of the Milwaukee section, American Chemical Institute, on February 27. Mr. Kressman related experiences in deriving products suitable for fuel for internal combustion engines and predicted that alcohol will be the future fuel for motors of this type because the gasoline supply is nearing its finish and because alcohol will soon be produced cheaply and in many new ways and from heretofore unheard of sources.

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Gasoline Prices Down in Milwaukee

MILWAUKEE, WIS., Feb. 27—Further reductions in gasoline prices were announced in Milwaukee on February 25, and motorists who have formed the habit of running their cars to the numerous downtown filling stations operated by the Standard and independent companies are expecting a season of operation considerably less expensive than a year ago. It is believed that the exceedingly close competition among the filling stations is responsible for this reduction, which is the second since January 1, 1915. Comparative quotations for tank wagon delivery, which prices also govern retail sales at filling stations, are as follows:

Test	Feb. 25, 1915	Jan. 18, 1915	July 1, 1914
60	10½ cents	11 cents	11½ cents
65	13 cents	13 cents	15 cents
70	15 cents	15 cents	17½ cents
72	16 cents	16 cents	19 cents

Garages are charging 2 cents over the above scale but, mainly of their own accord, are doing little business, excepting in emergency cases. Garagemen say they do not care to handle the fuel excepting for their own uses and purposes, because of the inability to make any money out of it. Practically the only business they now get is from owners who store their cars in garages and feel obliged to patronize the garage on such supplies, and from drivers who are nearly dry and want enough gas to get to their usual supply stations.

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CHICAGO, ILL., Feb. 26—The Standard Oil Co. of Indiana has reduced the price of gasoline and naphtha ½ cent a gallon, with a discount of 1 cent per gallon on 100-gallon lots to wholesalers, bringing gasoline down to a basis of 10½ cents and 9½ cents, and naphtha to 9½ and 8½ cents per gallon. Kerosene remains unchanged at 5½ cents.

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DETROIT, MICH., Feb. 24—A cut of 1-2-cent per gallon of gasoline went into effect at the gasoline stations controlled by the Standard Oil Co., the price now being 10 1-2 cents a gallon. Independent and other concerns supplying gasoline to retailers would not say today if they will reduce their price below the above mark. In several garages it was, however, predicted gasoline at less than 10 cents is only a question of a few weeks patience.

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Electrics Increasing in England

NEW YORK CITY, Feb. 26—The West Ham Electric Power Supply Co., England, has made special arrangements for furnishing current for charging the batteries of electric motor trucks. The great dearth of gasoline trucks due to the commandeering of those already in use and the factories in which they were manufactured by the British government for war purposes, has left many concerns without any means of motor transportation and the West Ham company has seized the opportunity by announcing that it will supply current for electric trucks, through the medium of a series of striking posters setting forth the convenience and reliability of operation and the cost of current consumption. Other large electric companies are expected to follow the lead made by the West Ham concern. As there appears to be a great field for the electric in England at the present time, several of the large American electric truck concerns have already opened agencies in England.

935 Trucks Shipped in January

Foreign Nations Take $2,545,527 Worth —1,803 Passenger Cars Valued at $1,313,153

WASHINGTON, D. C., March 2—Government figures made public today show that 935 motor trucks valued at $2,545,527 were exported in January, 1915, as against forty-four trucks valued at $77,491 shipped abroad in the same month last year. Exports of passenger cars dropped from 2,481, valued at $2,174,392 in January, 1914, to 1,803, valued at $1,313,153 in January, 1915. The figures show that truck exports to warring nations in Europe are growing by leaps and bounds. These figures are said to be among the most important issued since the war began.

4,859,200 Pounds of Rubber Imported

NEW YORK CITY, March 1—Imports of crude rubber at this port from January 12 to February 23 amounted to 4,859,200 pounds. The largest shipment was from Para on January 28 by the steamer Stephen which carried 1,540,400 pounds of rubber.

Apropos the probable effect of Germany's blockade of England on the crude rubber supply of the United States, if that should happen, it was stated by Sir Richard Crawford, the special commissioner attached to the British Embassy at Washington and appointed by his government especially to supervise all matters arising under the rubber and other embargos, that the British would undoubtedly sanction the shipment of rubber from the East to American ports either direct or by transshipment at Gibraltar. It was also stated by one of the tire manufacturers that this country, in case of a blockade, could do as it did before, when the Emden was creating havoc with English shipping in the Indian Ocean, get its supplies by way of the Pacific Ocean.

Gramm-Bernstein Refuses Truck Orders

LIMA, O., Feb. 27—Owing to the fact that the capacity of the plant is taxed to capacity, the Gramm-Bernstein Motor Truck Co., Lima, was compelled to refuse orders for motor trucks during the past week. The company is under contract with district agents to deliver a certain number of trucks monthly and these contracts have to be cared for. As a result an offer of a contract for 200 trucks for the domestic business received from the East had to be refused. Plans have been made for increasing the capacity of the plant but if they are carried out it will require about 90 days to complete them.

Republic Gets Order for 300 Trucks

ALMA, MICH., March 1—The largest single order of trucks ever received by the Republic Motor Truck Co., has been given to that concern by the Anglo-American Export Co., London, Eng. The contract calls for 300 trucks to be delivered in 1915.

Morton Gets Second Order—116 Trucks

HARRISBURG, PA., March 2—The second of the large truck orders placed by the allied armies, was received this week by the Morton Truck and Tractor Co., this city, from the British government and includes 116 trucks of 2- and 5-ton capacity. This, in addition to the order for 300 tractors reported in THE AUTOMOBILE last week as received from the Russian government, aggregates $2,000,000. The contract calls for delivery in 60 days, and the cars will be shipped from the Harrisburg plant as rapidly as they are completed. Work has been started on the large tractor order for the Russian government.

The plant is being operated to its fullest capacity and many additional employees have been put on in order to get the cars out on time. Samuel Morton and R. L. Morton, members of the firm, have been in England for some time giving demonstrations and it was through their efforts that the two large contracts were secured for the Morton company.

The type of tractor being built for the Russian government is of the four-wheel type of 120-horsepower and in construction is all that is necessary for the strenuous work in drawing gun carriages, ammunition and provision trains on the battlefield. The hood covering the engine and driver's seat will be of 5/16-inch steel plate and everything about the machine will be of the most substantial construction.

NEW YORK CITY, March 3—Shipments of Jeffery Quad trucks to the French government for use in the European war totaled two trainloads of twenty-six flat cars each last week.

This was the rush delivery of the first trucks to be sent in filling the recent $1,000,000 truck order placed by Commandant Dulauroy of French army, with the Thomas B. Jeffery Co., Kenosha, Wis.

Hub Truck Organization Completed

COLUMBUS, O., Feb. 26—The organization of the Hub Motor Truck Co., Columbus, O., recently incorporated with a capital of $300,000 has been effected by the election of J. L. Herpich, president; T. C. Haney, secretary-treasurer and M. C. Piercy, general manager. The first model of truck which is licensed under the Hub Motor Truck Co., of New York, is now being built at a local garage. It is expected to acquire a plant in Columbus for the manufacture of the trucks.

Blair Truck Co. To Be Developed

NEWARK, O., Feb. 27—Cincinnati interests represented by G. F. Osler, have closed an option for the financing and full development of the Blair Motor Truck Co. The truck which has been perfected by F. M. Blair, is being manufactured in small quantities at the Newark plant, but lack of capital is one of the drawbacks to development. The capital stock of the company has been increased from $100,000 to $225,000. The new truck is electrically driven from gasoline power and has direct transmission through a worm gear. Inquiries have been received from New York and Philadelphia for about 200 of the trucks for motor buses.

Receiving Ball Bearings from Germany

PHILADELPHIA, PA., Feb. 26—The news that an embargo has been declared on ball bearings exported from Germany does not seem to have seriously bothered the big importing interests in this country if the notice sent out by the Hess-Bright Mfg. Co. can be taken as an index. This states that in spite of the reported obstacles to the importation of ball bearings the company continues to receive shipments from the Berlin works. It also states that the total since September 15, 1914, has been 375,000 bearings of assorted sizes with one large shipment now en route. A substantial increase in orders is claimed over the figures of last year in spite of the delays due to the European war.

Germany Cuts Private Cars 50 Per Cent.

BERLIN, GERMANY, Feb. 26—The Bundesrath has adopted a measure by which the number of automobiles in Germany not being used for military purposes will be reduced by about one-half. The purpose of this is to save in the consumption

120-horsepower Morton tractor ordered in quantity for the allied armies in Europe

of gasoline and lubricant oils, and in rubber. The order issued provides that all automobiles, beginning March 15, must have new licenses. These will be issued only on proof of public necessity. The Bundesrath declares in this connection:

"This future limitation has particularly the purpose of eliminating all automobiles serving purposes of pleasure or sport. At the same time it will compel the public to employ other means of transportation, such as railroads, street cars and horse-drawn cabs, in increased measure."

Begin Assembling in Dallas Ford Plant

DALLAS, TEX., March 1—Actual assembling of automobiles was begun Monday at the plant of the Ford Motor Co., in Dallas. More than 150 men were put to work and the force will be increased until the output of sixty cars per day has been reached. Heretofore the new building has been occupied as a salesroom, but the assembling of cars was not begun until Monday.

Employees at the plant will get all the benefits of Henry Ford's unique profit sharing plan. No employee will receive less than $5 per day and in addition all will share in the profits of the company in the form of bonuses in proportion to the year's business and profits. The plant has many unique features and represents the most advanced ideas in factory buildings. A most unusual feature is a "race course" of miniature size on top of the building, where the assembled cars will be tested. During the past few days thousands of people have inspected the plant, as it is the finest in this section of the country.

To Sell Detroit and Tarrytown Maxwell Plants

NEW YORK CITY, Feb. 26—The last of the two Maxwell plants in Tarrytown and the Milwaukee avenue plant in Detroit are being offered for sale by Joseph P. Day of this city. The first Tarrytown plant was sold last June to the Chevrolet Motor Co., which combined the local Fifty-seventh street plant and the Tarrytown plant under the New York City management to build right-hand Chevrolets.

The latest Tarrytown plant to be sold comprises about 150,000 square feet of floor space with a frontage on the Hudson River. The Detroit plant comprises about 215,000 square feet of floor space and is situated on the Grand Trunk Railway. When the Maxwell-Briscoe Motor Co. was in full operation in Tarrytown it occupied two plants, one known as the Kingsland Point plant, the first one to be sold, and the other known as the Beekman avenue plant, now for sale.

In 1913 Walter E. Flanders, president and general manager of the Maxwell Motor Co., made it known to the trade that the Maxwell company did not intend to operate all of the eleven plants which were acquired by the purchase of the United States Motor Co.'s assets. The factories totaled 2,684,648 square feet of floor space. The Providence, R. I., Newark, N. J., Hartford, Conn., Auburn, R. I., and one of the Tarrytown plants, have been sold out of the original eleven. The Providence plant was sold to the Universal Winding Co., Providence, in December, 1913, and the Columbia plant in Hartford was sold to the Billings & Spencer Co.

No Need To Test Army Trucks

Senator Lodge Points Out That Foreign Belligerents Find Our Vehicles Satisfactory, So Why Shouldn't We?

WASHINGTON, D. C., Feb. 28—Debate in the Senate on the house provision in the army appropriation bill for $25,000 for the testing of types of armored motor cars was enlivened by Senator Lodge. It was pointed out that the manufacturers of trucks in this country are shipping them by the hundreds to Europe, where they are reported as giving satisfaction. Therefore, it was considered by the senatorial opponents of the provision that there is no necessity to conduct expensive tests. In this connection, Senator Lodge said:

"In making some examination for a speech I made here on national defense I examined into this question of motor trucks and cars. We have not an armored motor car in the army and I was informed at the war department that they had not been able yet to find a perfect truck; they were still testing them and looking for a perfect truck. Canada has bought a lot of our motor trucks for use in the field and finds them sufficiently good for use in the field. Russia has bought more. They said, in reply to that, that the trucks we sold to Canada did not seem wholly satisfactory; and, on that ground, in this country, with all the motor car manufacturers we have, we are deliberately told that we cannot have a motor truck; we must raise $25,000 and wait a year in testing them. The money is of no consequence, but we must wait a year testing them to find a suitable motor truck. Why, they have thousands of motor trucks in the armies of Europe and we have none. Some motor trucks are better than no motor trucks; and the officers of the war department are sitting here looking around to find a perfect truck, and in the meantime we have none."

NEW YORK CITY, March 2—Princeton students have contributed $1,100 to the American Ambulance Hospital in Paris. The money, which was received by J. P. Morgan & Co., will be used to purchase an ambulance for wounded soldiers in France. It is expected Princeton volunteers will be assigned to drive the car at the front. Contributions for the American Ambulance Hospital now total $346,451.82.

EAST LIVERPOOL, O., March 1—The plant of the Columbiana Rubber Co., East Liverpool, has been sold to a syndicate of capitalists from Mansfield, O., at a price which has not been made public. The appraised value of the plant is $85,000 and has a capacity of 400 automobile tires daily. The announcement is made that the plant will resume operations in a few weeks.

Delion Tire & Rubber Co. Opens Plant

TRENTON, N. J., Feb. 26—The opening of the plant of the Delion Tire & Rubber Co., this city, took place this afternoon with speeches by Senator Leavett of Mercer county, and Major L. N. Clayton. The Delion is the eighth rubber tire plant to locate in Trenton, making that city next to Akron in the matter of numbers and importance in the tire industry, which has already assumed imposing proportions.

The plant is of the latest construction throughout, consisting of brick and concrete, the size of the factory being 238 by 75 feet with two floors. The latest tire making machinery and labor saving devices are used. The company will produce about 400 tires and 600 tubes a day when working on full time and will employ 300 men. No hard rubber tires will be manufactured. Delion tires will carry a guaranteed mileage of 4,000 miles. Active manufacturing will start March 1. The first Delion tire was made at the opening of the plant. It was a 37 by 5 plain tread. The complete steps were shown the visitors.

The officers and directors of the company are: H. H. Colemen of Newark, president; F. J. Wetzel, of Trenton, vice-president; G. H. Graham, Jr., secretary and assistant treasurer; directors, Charles R. Whitehead, of Morristown; L. B. Tompkins, of Morristown; Manuel Llara, F. G. Hasselman and W. T. Rock, of New York City; Warren A. Clapp, of East Orange, and Lionel Emdin, of New York City. Mr. Emdin will also be general sales manager, with headquarters in a new store at 1791 Broadway, New York City. The company was incorporated in 1913 with a capital of $500,000 and recently raised that to $750,000.

New plant of the Delion Tire & Rubber Co., Trenton, N. J., opened last Friday

Studebaker Profits Gain 150.6 Per Cent.

$4,441,966.16 Net Profits for 1914—Surplus is $5,265,819.45—Debts Reduced $4,168,978.98

SOUTH BEND, IND., Feb. 25—The fourth annual report of the directors of the Studebaker Corp. and its subsidiary companies, for the year ending December 31, 1914, shows net profits of $4,441,966.16, as against $1,772,473.65 net profits in 1913, which is an increase of $2,669,492.51, or 150.6 per cent.

After the payment of the regular dividends on the preferred stock and transfer to special surplus account of the amount required to be set aside therein, the balance of the profits, $3,165,893.11 was added to surplus and this account showed a total credit, as of December 31, 1914, of $5,265,819.45 and the special surplus account showed a balance of $1,230,747.54.

The net profits gave the company a return of 12.8 per cent. on the outstanding common stock, after deducting the payment of the 7 per cent. preferred stock dividends, as against a return in 1913 of 3.1 per cent., but rather than use any part of the profits for the payment of dividends on the common stock, the directors believed it the wiser policy during the year to devote the profits to the payment of debts and to the increase of the cash balance, which resulted in a debt reduction of $4,168,978.98 and an increase of $1,581,703.05 in the cash on hand, making a total improvement in this respect of $5,750,682.03 for the year.

Total Net Sales $43,444,223.41.

The total net sales for the year were the largest in the history of the business, amounting to $43,444,223.41, as compared with $41,464,949.82 for 1913, an increase of 4.8 per cent.

Shipments in 1914 were 36,430 cars, compared with 32,504 in 1913. At the close of the year the company had made and sold over 150,000 Studebaker cars.

During the year the corporation purchased the remaining 6 per cent. of the stock of the Studebaker Corp. of Canada, Ltd., Walkerville, Ont., and now owns this company entirely.

The report shows that the corporation's working capital on December 31, 1914, was $14,771,150, an increase of $2,892,132. Of the $8,000,000 of 5 per cent. gold notes sold in March, 1912, $2,450,000 have been retired. Quick assets total $24,665,019, against which stand liabilities of $9,893,869.

The net expenditures for plant and property during 1914 were $551,872.54 and the depreciation credits were $361,794.01, so that only $190,078.53 was added to this account.

The by-laws of the company provide for a fund of $1,000,000 for the redemption of the preferred stock before dividends can be initiated on the common shares. The annual report shows a fund of $1,320,000.

Subsidiary Firms Included

The company has $12,180,000 in preferred stock and $27,931,600 in common stock. The active subsidiary companies of the corporation whose accounts are merged in the report are the Studebaker Corp. of America and the Studebaker Harness Co., of South Bend, Ind.; the Studebaker Corp. of Canada, Ltd., Walkerville; the Studebaker Bros. Co., Northwest, Portland, Ore., and the Studebaker Bros. Co. of Utah, Salt Lake City, Utah.

The report of the Studebaker Corp. for the year ended Dec. 31, 1914, compares as follows:

Profit from	1914	1913	1912	1911
Mfgs.	$5,703,942	$2,767,458	$3,342,560	$2,691,848
Other inc.	133,965	83,465	122,392	113,089
Total inc.	$5,837,907	$2,850,923	$3,464,952	$2,804,937
Sal. and Dep.	492,511	367,788	339,076	270,895
Balance	$5,345,396	$2,483,135	$3,125,876	$2,534,042
Charges	500,732	578,722	528,202	483,981
Surplus	$4,844,664	$1,904,413	$2,597,674	$2,050,061
Pfd. div.	869,050	901,075	930,825	708,750
Balance	*$3,975,614	$1,003,338	$1,666,849	$1,341,311
Extra exp. chgd. off.	402,688	131,939	284,429	396,479
Surplus	$3,572,916	$871,399	$1,382,420	$944,832

* Equal to 14.23 per cent. on $27,931,600 common stock against 3.59 per cent. on same stock previous year (after deducting full 7 per cent. preferred dividend and before charging off $402,697 for extraordinary expenses).

Net sales for the year were $43,444,223 as compared with $41,464,950 the previous year.

The consolidated balance sheet of the Studebaker Corp. as of December 31, 1914, compared as follows:

ASSETS

	1914	1913	1912	1911
Trade name, good will, pat'ts, etc...	$19,807,277	$19,807,277	$19,807,277	$19,807,277
Real estate, bldgs., mach. and equip..	12,058,040	11,867,962	10,589,651	10,297,480
Frgn. trade marks.	.....	5,336	5,156	4,892
Inv. in other cos...	247,654	246,509	1,075,692	1,199,640
Inventories	13,470,564	16,622,229	15,730,841	14,391,250
Accts. and notes receivable	6,698,148	5,923,793	4,958,121	5,668,661
Ins. unexpd., int. prepaid, etc.	382,421	376,520	440,445	263,308
Disc't and com on notes	327,068	412,859	506,632	381,829
Susp. acct.	.....	402,496	472,270	489,448
Cash	3,539,164	1,957,460	865,795	1,672,434
Total	$56,530,336	$57,622,440	$54,451,881	$54,176,222

LIABILITIES

Pfd. stock	$12,180,000	$12,650,000	$13,095,000	$13,268,479
Com. stock	27,931,600	27,931,600	27,931,600	27,931,600
Min. stkhldrs. int. in cap. stk. sub. cos.	28,300	54,341	28,300	28,300
5% gold nts.	5,550,000	6,800,000	7,600,000	.....
Nts. payable	1,850,000	4,550,000	1,400,000	10,050,000
Drafts disc.	.....	.....	.....	318,312
Dep. rec. on con. for sales of autos.	284,325	249,594	327,159	321,296
Accts. pay.	1,853,160	2,098,134	1,182,944	1,044,623
Sundry res.	356,384	365,120	559,625	268,777
Spec. surp. account.	1,230,748	823,724	*417,009	.....
Surplus	5,265,819	2,099,926	1,910,243	944,832
Total	$56,530,336	$57,622,440	$54,451,881	$54,451,222

* Applied to purchase of preferred stock for cancellation under provision of charter

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YOUNGSTOWN, O., Feb. 26—The issuing of $2,500,000 preferred stock has been approved by stockholders of the Republic Rubber Co. The new issue will have a maturity of 15 years, and will bear the same dividend rate as the stock redeemed under the old issue. Recommendation was also voiced that $1,000,000 additional stock be issued in the near future to take care of expansions.

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LOS ANGELES, CAL., Feb. 24—The Master Carbureter Corp. has distributed a 25 per cent. cash dividend to its stockholders. The concern, which was incorporated in 1913, has a capital stock of $150,000, and has been making 800 to 900 carbureters a month. The business outlook is reported to be very satisfactory.

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AKRON, O., Feb. 26—The Goodyear Tire & Rubber Co., this city, which previously has paid dividends once each year, announces that hereafter dividends will be declared quarterly. The first quarterly dividend of 3 per cent. was paid March 1, to holders February 20. An annual dividend of 12 per cent. was paid last November.

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King Gives Employes 7½ Per Cent. Bonus

DETROIT, MICH., Feb. 22—A bonus equal to 7 1-2 per cent. of their total wages for the year 1914 was given last week to the working men of the King Motor Car Co. There were 25 per cent. more men on the pay roll in 1914 than the previous year.

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Weidely Motor Co. Is Organized

INDIANAPOLIS, IND., Feb. 24—The Weidely Motor Co. has been incorporated and taken a factory building at 133-43 South West street in this city, to manufacture the Weidely motor. The organization is: President, W. E. Showers, Bloomington, Ind.; vice-president and general manager, George A. Weidely; treasurer, W. A. Umphrey; secretary, L. A. Poundstone; directors, Edmund Rosenberg and George Hughes.

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Gaulois Tire Reduces Prices

NEW YORK CITY, March 1—The Gaulois Tire Corp., importer of the Gaulois tire, made in France, has reduced the prices on all its tires. The 34 by 4 non-skid rubber tread has been reduced from $41.30 to $32.45 and the 37 by 5 non-skid rubber tread has been reduced from $60.40 to $47.95 Other sizes have been reduced in proportion

The company is receiving weekly shipments from the factory in Clermont-Ferrand, France. J. Grenies will soon start from this city to appoint agencies in Detroit, Cleveland, Buffalo, St. Louis, Kansas City, New Orleans, and other centers.

To Bring Out a New Lozier Car

New Company Will Continue Four and Six—To Center All Activities in Detroit Plant

DETROIT, MICH., Feb. 26—Within the next 2 weeks the new owners of the Lozier Motor Co., will place on the market a new Lozier car which will have all the features and characteristics of the former Lozier models. The price will be between $1,800 and $2,000. The big six and the four which were made before the company went into bankruptcy are also to be continued by the new management. At the present time about 175 men are being employed and the force will be gradually increased. W. G. Thomas, formerly with the Pierce-Arrow, E. R. Thomas and Packard companies, has been appointed production manager. H. H. Williams, who has been with the Lozier organization for many years, is in charge of the service and sales department. Many of the former Lozier dealers will continue to handle the Lozier cars. There will be no resumption of operation of the former Lozier plant in Plattsburg, N. Y. This property will be sold. All production and service activities are concentrated in the local plant.

$500 Elco 30 Enters the Field

SIDNEY, O., Feb. 27—A five-passenger touring car called the Elco 30 and selling for $500 with single-unit electric lighting and starting equipment, will shortly be placed on the market by the Bimel Buggy Co., this city, of which A. C. Noble is president and T. M. Miller manager and treasurer.

The power plant will be a Davis unit with block-cast L-head cylinders 3 by 4, multiple disk clutch and three-speed gearset. Ignition will be by Atwater Kent system, lubrication by constant level splash, cooling by thermo-syphon and the carbureter a Zephyr. Regular equipment will include 30 by 3 tires; with 30 by 3 1-2 straight side tires and demountable rims the price will be $50 extra. Wheels will be of wood; wheelbase, 102 inches; tread 56 inches. Lamps, electric horn, tool kit, jack and pump will be regular equipment.

Market Reports for the Week

NEW YORK CITY, March 3—Market reports this week were generally steady. Tin was again excited and higher in sympathy with the violent advances at London, causing increased buying of future positions at a sharp advance. The visible supply of tin in Europe and the United States in February increased 647 tons, the total visible on February 28 being 14,548 tons. Most of the other metal markets were strong and steady with the exception of copper, which experienced small sales during the week. At London there were some few sales of American electrolytic, the market being weaker in tone. The most interesting copper development, however, was the report of further negotiations of copper for export on the part of Russia and Germany. Although no shipments can be made to Germany under present conditions, orders are pending with the sellers willing to pay interest on deferred shipments.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.18½	.18½	.18	.18	.18	.18	—.00½
Beams & Channels. 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	.....
Bessemer Steel, ton.	18.50	18.00	18.00	18.00	18.00	18.00	—.50
Copper, Elec., lb.	.14½	.14½	.14½	.14 13/20	.14¾	.14¾	+.001/10
Copper, Lake, lb.	.14¾	.14¾	.14¾	.14¾	.14¾	.14¼	.....
Cottonseed Oil, bbl.	6.80	6.76	6.84	6.82	6.82	6.73	—.07
Cyanide Potash, lb.	.21	.21	.21	.21	.21	.21	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	..	.12	.....
Lard Oil, prime	.92	.92	.92	.92	.92	.92	.....
Lead, 100 lbs.	3.85	3.90	3.90	3.90	3.90	3.92½	+.07½
Linseed Oil	.60	.60	.60	.60	.60	.60	.....
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	.....
Petroleum, bbl., Kans. crude	.40	.40	.40	.40	.40	.40	.....
Petroleum, bbl., Pa., crude	1.50	1.50	1.50	1.50	1.50	1.50	.....
Rapeseed Oil, refined.	.75	.75	.75	.75	.75	.75	.....
Rubber, Fine Up-Para	.59½	.59½	.59½	.59½	.59½	.59½	.....
Sil, raw, Ital.	..	3.90	..	3.90	3.90	3.85	—.05
Silk, raw, Japan	..	3.30	..	3.30	3.32½	3.32½	+.02½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	37.75	38.00	38.75	39.50	40.50	40.50	+2.75
Tire Scrap	.05	.05	.05	.05	.05	.05	.....

Automobile Securities Quotations

NEW YORK CITY, March 3—Several of the stocks on the securities market made large gains during the past week while a number of others showed declines which were, however, less marked. Some of the large gains are Aluminum Castings, 3 points; Firestone common, 10 and preferred, 1; Peerless common, 5; Portage Rubber common, 4 and preferred, 5. Kelly-Springfield Tire showed a pronounced reaction the common dropping 8 1-2 points and the first preferred 2 although the second preferred gained 1. Miller Rubber common declined 5 points as did Stewart-Warner common although the preferred of the latter gained 1-2 point. White lost 5 points and Willys-Overland common 1-2.

This week the official quotations of the Detroit Stock Exchange have been added to our regular report based on the New York City market. This will enable our readers to keep track of values in the two cities whose automobile securities markets are most important.

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Net Ch'ges
Ajax-Grieb Rubber Co. com	200	..	250	..	..
Ajax-Grieb Rubber Co. pfd	99	102	100	..	..
Aluminum Castings pfd	97	100	98	100	+3
J. I. Case pfd	..	..	75	80	..
Chalmers Motor Co. com	84	87	..	90	..
Chalmers Motor Co. pfd	92	94	91	93½	..
Electric Storage Battery Co	..	..	47½	48½	..
Firestone Tire & Rubber Co. com	285	290	380	..	+10
Firestone Tire & Rubber Co. pfd	108½	109½	108	109½	+1
General Motors Co. com	68½	69¼	92	93½	—2
General Motors Co. pfd	91	91½	94	95	—1
B. F. Goodrich Co. com	22¾	23¾	31½	32	—1½
B. F. Goodrich Co. pfd	87¼	90	96	97	— ¼
Goodyear Tire & Rubber Co. com	212	218	188	190	—2
Goodyear Tire & Rubber Co. pfd	96	97½	102	103	+1
Gray & Davis, Inc., pfd	90	97	..	..	..
International Motor Co. com	..	5	..	..	..
International Motor Co. pfd	..	15	..	..	..
Kelly-Springfield Tire Co. com	54	56	104	105	—8½
Kelly-Springfield Tire Co. 1st pfd	125	130	82	83	—2
Kelly-Springfield Tire Co. 2d pfd	..	..	122	127	+1
Maxwell Motor Co. com	5¼	5¾	24	25	+1¼
Maxwell Motor Co. 1st pfd	27¼	28	62½	63½	+1
Maxwell Motor Co. 2d pfd	9	9½	25	26	..
Miller Rubber Co. com	..	..	155	160	—3
Miller Rubber Co. pfd	..	..	101	103	..
New Departure Mfg. Co. com	..	..	122½	127	..
New Departure Mfg. Co. pfd	..	..	105½	108	..
Packard Motor Car Co. com	..	..	..	99	..
Packard Motor Car Co. pfd	96	98½	95	..	+2
Peerless Motor Car Co. com	..	30	20	21	+5
Peerless Motor Car Co. pfd	..	80	..	55	..
Portage Rubber Co. com	..	40	34	36	+4
Portage Rubber Co. pfd	..	90	85	95	+5
*Reo Motor Truck Co	7½	8½	10¾	11¾	— ¾
*Reo Motor Car Co	18	18½	26	26¾	+1½
Stewart-Warner Speed. Corp. com	56	57½	48	51	—3
Stewart-Warner Speed. Corp. pfd	98	100	101	103	+ ½
Studebaker Corporation com	25½	26½	45	45½	—1¾
Studebaker Corporation pfd	81	83	93	94	—2
Swinehart Tire & Rubber Co	69½	70½	73	75	+4
Texas Company	..	..	126½	127½	..
U. S. Rubber Co. com	58⅜	59¼	54	55	—2½
U. S. Rubber Co. pfd	101¼	101¾	101	102	—1
Vacuum Oil Co	..	..	184	186	..
White Co. pfd	107	110	103	108	—5
Willys-Overland Co. com	67	68	95	96	— ½
Willys-Overland Co. pfd	94	97	95½	96	..

*Par value $10; all others $100 par value.

Official Quotations of the Detroit Stock Exchange

	1914 Bid	1914 Asked	1915 Bid	1915 Asked
ACTIVE STOCKS				
Chalmers Motor Co. com	82	85	..	85
Chalmers Motor Co. pfd	..	93½	90	..
General Motors Co. com	72½	74½	91	93
General Motors Co. pfd	91½	94	93½	95
Maxwell Motor Co. com	5	5¾	24	25½
Maxwell Motor Co. 1st pfd	27	28	63	65
Maxwell Motor Co. 2d pfd	9	10	25	26
Packard Motor Car Co. com	101	106	..	98
Packard Motor Car Co. pfd	96	98½	95	97½
*Reo Motor Car Co	18⅛	19	26	27
*Reo Motor Truck Co	8	8½	10⅞	11⅝
Studebaker Corporation com	..	..	45	46½
Studebaker Corporation pfd	..	..	91	95
Continental Motor Co. com	..	165	..	190
Continental Motor Co. pfd	..	75	80	85
INACTIVE STOCKS.				
Atlas Drop Forge Co	..	21	..	..
Ford Motor Co. of Canada	500	..	500	..
Kelsey Wheel Co	..	200	195	..
W. K. Pruden Co	..	21	19	20
Regal Motor Car Co. pfd	..	50	..	22

*Par value $10; all others $100.

Baker Patent Is Void

Court Refuses To Grant Injunction in Suit Against Former Chalmers Representative

CLEVELAND, O., March 2—In an opinion just rendered, Judge John H. Clarke, in U. S. district court, upheld the prior art claims of the defense in action of the American Ball Bearing Co. against Edward B. Finch, former Cleveland representative of the Chalmers Motor Co. He refused to grant an injunction or damages for what the complaint alleged as infringement of a patent issued to Walter C. Baker, of the Baker Electric Vehicle Co. and the American Ball Bearing Co.

Judge Clarke reviewed the evidence at length, with the statement that: "The only question I shall consider is: 'Is the combination of the patent such as to have required inventive genius to develop it in a mind informed in the art to which it relates at the time the patent was applied for in February, 1902?' "

The desirability and importance of bringing the steering knuckle as closely as practical to the hub and to the plane of the tread were perfectly understood prior to 1902. Such appears in the testimony of Professor Carpenter, expert witness for the plaintiff, and in that of Mr. Baker and is clearly shown by the Faure patent, 591,595, in 1897; by the Clubbe and Southey patent, 621,017, in 1898, and by the Knudsen reissued patent, 11,721. Thus it is clear that the locating of the steering knuckle was actually practiced prior to 1902.

The Robinson patent, 599,266, in 1898, has for its object the improving and simplifying of the construction of ball bearings for vehicles and the drawings of this patent clearly show the anti-friction balls near the outer and inner ends of the spindle, the larger ones being nearer the inner end.

Professor Carpenter said: "It would be idle for me to take the stand that Mr. Baker was the first to employ anti-friction bearings in the spindle of a steering axle, nor does the Baker patent assert that he was the first to do so."

He said it was the general practice prior to 1902 where a load shaft was supported by bearings at the two ends, to vary the sizes of these bearings according to the location of the load along the length of the shaft.

Artillery wheels, too, the evidence shows, were in general use before even the advent of the automobile.

It seems clear that not only were all of the features of the claimant combination familiar to persons skilled in the art of 1902 or even in 1898, but that the arrangement as provided in the Baker patent and the reason for such adjustment would seem to have been obvious.

It seems clear that the various elements of the Baker patent are not so grouped as to produce any new or useful result. The knuckle close to the plane of the wheel produces the same effect in the Baker construction as it did in the Panhard of 1902, a model of which was offered in evidence. At best it is a slight carrying forward of ideas which the state of prior art shows were common among men skilled in it.

This conclusion involving as it does the finding that the patent suit is void for want of patentable novelty and invention, makes unnecessary the consideration of the many other questions stated upon the record in this case.

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Orders Re-opening of Kardo Suit

CLEVELAND, O., March 3—*Special Telegram*—Judge John H. Clarke has ordered a re-opening of the suit of the Kardo Co., substituting for the American Ball Bearing Co. in action against Henry J. Adams, former representative for the Reo factory and dealing locally as the Reo Motor Sales Co. This suit charges infringement of Patent 792,690 issued to Alanson P. Brush, of Detroit, and covering a compensating mechanism termed the floating spider in the bevel gear drive. It is stated that the reopening of the case is the first step in a further investigation into the organization and purpose of the Kardo Co.

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Dividends for Creditors of Four Bankrupts

DETROIT, MICH., Feb. 26—The creditors of four bankrupt automobile manufacturing concerns are receiving or will shortly receive dividends from the Detroit Trust Co., receiver for the concerns. The creditors of the Lozier Motor Co., are to receive a first dividend of 5 per cent. which will total about $160,000; the first dividend to the creditors of the American Voiturette Co., will be 10 per cent. and total about $50,000. A fourth dividend of 5 per cent. has been ordered paid to creditors of the Flanders Mfg. Co., making the total to date 50 per cent. or about $500,000. Application was also made to the court to pay a final dividend to the creditors of the Warren Motor Car Co., making a total of 20 per cent. or about $80,000.

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DETROIT, MICH., Feb. 27—The Keeton Motor Car Co., this city, has purchased the Keeton business from S. L. Winternitz. It is the intention of the company to reorganize and not only to continue to furnish all repairs for Keeton cars, but to continue their manufacture in a small way. According to announcement from that company, it is able to furnish repairs promptly. Delivery of cars can be made within a week or 10 days from receipt of order.

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BOSTON, MASS., Feb. 26—The stockholders' committee of the Walpole Tire & Rubber Co. has joined with the reorganization committee, of which J. H. MacAlman is chairman, and hereafter these two committees will act jointly in the interests of stockholders. The proposed plan of reorganization as outlined by the joint committee in a letter just issued, is for a company with $500,000 first mortgage, 6 per cent., 10-year bonds, $1,500,000 non-cumulative 7 per cent. preferred stock of a par value of $100, and $1,000,000 common stock with a par value of $50.

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CINCINNATI, O., Feb. 26—At a meeting of the creditors of the Crescent Motor Co., Carthage, O., held recently, the proposition of Col. F. B. Enslow, of Huntington, W. Va., to take over the real estate in exchange for his bonds and to pay 75 per cent. of the appraised value of the unmortgaged property, was accepted. The offer also includes the assuming of a mortgage of $22,000 held by an insurance company on the real estate.

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NEW YORK CITY, March 3—Judge Mayer has appointed Francis Gilbert receiver for the Motokart Co., 1790 Broadway, bond $2,000. It was stated that on October 13 last the company, through an attorney, issued a statement that the assets were $90,000, against which there were mortgage debts of $15,000 and merchandise accounts $21,000, and that the depreciation since then would bring the total assets down to $25,000.

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Good Samaritan Help League Formed

NEW YORK CITY, Feb. 26—The Good Samaritan Help League of Motorists has been formed in this city with the following officers: Dr. G. A. Englert, president; P. J. Knauss, vice-president; and R. A. Effenberger, secretary and treasurer.

The difficulty experienced by motorists in obtaining help or assistance on the road, when in trouble, prompted the formation of the league, the object of which is to "help others as you yourself would like to be helped." The league is open to all motorists. No dues are charged those joining the league. Only an entrance fee of 50 cents which makes them a life member and entitles them to an official signal banner and membership card. Members will display the signal when in need of assistance of any kind, and passing motorists will see the banner and render what help they can.

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National Safety First Society Formed

NEW YORK CITY, Feb. 26—The Safety First Federation of America, which has for its objects uniform laws for control of automobile traffic and improvement of street traffic conditions throughout the country by a standard system of supervision, was organized yesterday by delegates who met at 6 East Thirty-ninth street, this city.

The motto of the federation is "Conservation of Life, Limb and Property," and its object is to procure legislation toward this end in all of the states and Canada. Another general meeting of the federation is to be held in Detroit in September, when a number of Canadian organizations will be admitted to membership. Thereafter conventions are to be held annually.

One of the important changes in the present automobile license system discussed at the meeting was that of photographing and licensing owners and chauffeurs on a common basis similar to the methods employed in England, Germany and France. It is planned to establish a compulsory examination for the owners of the cars

as to sight, hearing and operative ability. A photograph of the owner will be pasted to the license cards to identify them in the event of an accident. A picture will also be retained by the board of examiners.

At today's meeting officers and directors were elected. The board of directors includes police commissioners, representatives of automobile clubs, and civic organizations from fourteen cities. The officers elected were as follows: Vice-presidents—Police Commissioner H. W. Newman of New Orleans; C. N. Talbert, director of streets, St. Louis; Police Commissioner John Gillespie, Detroit; J. H. Lippincott, New Jersey Traffic commission. Treasurer—C. L. Bernheimer. Executive secretary, F. H. Elliott, New York City.

A committee was appointed to nominate a president for election at the next meeting at Detroit, in September.

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107 Exhibits at Brooklyn Show

BROOKLYN, N. Y., March 2—Brooklyn's fourth automobile show under the management of the Brooklyn Motor Vehicle Dealers' Assn. opened tonight at the Twenty-third Regiment Armory. In all there are 107 different exhibits, of which forty-eight are car displays. There are six makes of trucks.

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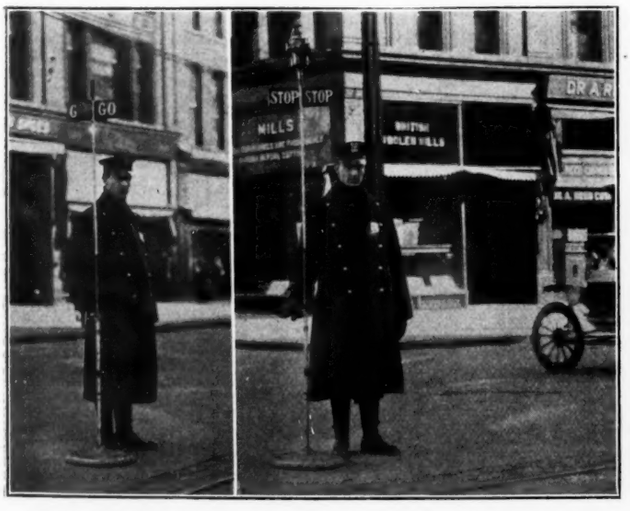
$1,000,000 Sales Expected at Des Moines

DES MOINES, IA., March 1—Forty-four makes of automobiles will be on display at the annual Des Moines Auto Show which will open at the Coliseum on Monday, March 8, for the first 1915 showing to the Iowa territory which last year bought 34,370 automobiles for which was paid the sum of $25,771,500, estimating $750 as the average cost per car. Basing their estimates on previous shows, Des Moines dealers predict that the sales at the show alone will approach the million dollar mark.

Iowa led all the states of the Union last year in the value of her farm products, according to the U. S. Department of Agriculture. The aggregate value of the Iowa crops was $351,450,000 as compared with $327,996,000 in 1913 and with $319,656,000 in Illinois, the second state in rank last year. With such figures at hand it is demonstrated that the Iowa field is the best in the nation for the automobile business this year and the Des Moines show is expected to mark the opening of a season which will break even the record of last year.

The Automobile Institute of the Iowa State College at Ames will be in daily session at the Coliseum during the show. Lectures and demonstrations will be given. When it is considered that in Iowa there are now approximately 115,000 pleasure and commercial cars, that the annual expenditure for fuel is $5,500,000 and for tires $12,500,000 with 20 per cent. of this sum wasted on account of the carelessness of owners, the importance of the institute work can be realized. R. A. Leavell, of Chicago, formerly instructor in the Armour Institute of Technology and the Chicago Motoring School, will conduct the institute. It will be free to all those who attend the show.



The illustration shows the device invented by Secretary of Police Walters, of the Detroit, Mich., police department, which is now being tried on Woodward avenue. During the day the post is not surmounted by the oil lamp shown at the right. The word Stop is red, the letters being white. The word Go is white on a green plate. At night a red light is shown over the word Stop and a green light over the word Go.

Hub Show at 2 P.M.

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Over 400 Cars, Trucks and Chassis To Be Displayed in Grecian Bower

BOSTON, MASS., March 1—Manager Chester I. Campbell of the Boston Automobile Dealers' Assn., took charge of Mechanic's building today with an army of 350 workmen to transform the structure into a Grecian bower for the annual motor show. He has changed his plans this year so that the show is to be opened at 2 next Saturday afternoon instead of at 8 Saturday night as in former years. This will do away with the great crush that marked the opening of the show each year it is expected.

This year it will be a combination passenger car and truck exhibition, the dealers having voted some time ago to discontinue the separate truck show of past years. In order to get the trucks in it was necessary to shorten up a little on some of the spaces upstairs so that more exhibitors could get in. As a result there will be a larger display of vehicles than in the past. There will be some makes new to Boston, for several agencies have been closed the past few months, and as soon as this was done application was made for space. The late comers were willing to take anything that they could get. Some of them will be forced to show in the basement with the trucks, but the greater number will be in the two big halls upstairs.

The decorations this year will be along the lines of Grecian scenes. Last year they were Venetian. In Grand Hall a temple 25 feet high, surmounted by a gilded dome, will rise up at the intersections of the main aisles. The ceiling will be studded with lights and streamers of electrics will run in all directions across the hall.

In Grand Hall the larger number of makes that have occupied the stage and main aisles will be seen again, such as the Pierce-Arrow, Packard, Cadillac, Peerless, Winton, White, Stearns, Locomobile. The Stevens-Duryea space will be occupied by the Maxwell and the Marmon line will have the Knox space. In the balcony above there will be a lot of accessories as usual.

In Exhibition Hall, the triangular section, the space will be transformed into a Grecian grove. There will be a series of large white columns, and at different sections there will be many trees whose branches will form arches across the aisles.

In this hall there will be a great number of exhibitors, for there is more room. They will comprise about all the well-known makes on the market. This year there will be an absence of the cyclecars which were so numerous a year ago. The management states that there will be more than 400 vehicles and chassis on exhibition, and the total exhibitors will be more than ever. Despite the ban on accessories by the Accessory association, there will be all the well-known devices displayed through the medium of the local dealers.

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Farmers Buy Cars at Tacoma

TACOMA, WASH., Feb. 26—Sixty-five automobile and accessory dealers exhibits completely filled the Glide rink at Tacoma during the second annual automobile show, the week of February 15. Instead of being strictly a Tacoma show this year, it was a great distributing show for the Pacific Northwest; dealers from both Portland and Seattle exhibited with the Tacoma dealers, and worked with each other in entire harmony during a most profitable week.

The show was opened by Governor Lister, President George H. Stone, of the Chamber of Commerce, and President D. A. Outcalt, assisted by many officers of the Tacoma Automobile Club, and many out of town visitors.

A total of forty-two pleasure cars were exhibited by seventeen dealers, and three dealers exhibited trucks.

Among the purchasers of cars were many grain men, as the Northwest has received a large share of the returns from wheat and flour, both Tacoma and Seattle having exported many thousands of tons to Great Britain and the Orient during the past few months. The lumber business has been quiet for some time past, otherwise sales would have undoubtedly been doubled. However, the majority of exhibitors were well pleased with the treatment accorded them and the interest manifested by the large attendance each day, which varied from 500 in the afternoon to 2,000 each evening.

Financially the show was a great success and the dealers were unanimous in declaring for a repetition of the event in 1916, when it will be repeated but will undoubtedly have to be housed in a much larger building more centrally located.

Jitney Movement Reaches Eastern Cities

J. N. Willys Predicts Sensational Transportation Developments

PASADENA, CAL., Feb. 26—"The strong political influences exerted by electric street railway interests may succeed for a short period in retarding the sudden and great development of the jitney bus but it will never be able to suppress that new and popular means of transportation," declared John N. Willys, president of the Willys-Overland Co., in the course of an interview on the jitney situation at his winter home in Pasadena, Cal. Since arriving in California, Mr. Willys has made a study of the jitney bus in the cities where its remarkable rise to popularity started.

Mr. Willys believes that the world is just upon the eve of most startling developments along this line.

"Why," he continued, "in England the jitney business is no longer confined to the cities. There have been dozens of bus services established between smaller towns. Out of London lines run in all directions carrying passengers into the country to points which have never before been available to the rank and file.

"At the beginning of the war a tremendous movement was on foot to nationalize motor bus transportation, and compete more and more with steam railways, which in their suburban passenger traffic already are being hard hit by bus competition. In historic old Oxford the trams have entirely disappeared from the streets."

Mr. Willys is of the opinion that manufacturers of moderate priced cars will soon be turning their attention to the production of a special type of automobile which will serve better than the standard touring car as used today for jitney purposes. At present the jitney service makes a splendid outlet for second-hand cars.

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KENOSHA, WIS., Feb. 27—Orders for $75,000 worth of jitney buses were received during the past week by the Thomas B. Jeffery Co. Among these was one order for ten twenty-passenger motor buses for the Universal Bus & Taxi Co., which is the official hotel bus company for the Panama Exposition at San Francisco. These buses are built on the 1 1-2-ton Jeffery standard chassis, and the bodies were all made in the Jeffery shops at Kenosha, just outside of Chicago. They have 7 feet clearance inside.

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Jitneys in Dallas Boost Car Sales

DALLAS, TEX., Feb. 25—During the month of February, according to estimates handed out today the street railway company at Dallas lost at least $30,000 from the operation of jitney cars in Dallas. There are now 412 licensed jitney cars in the city and the number is increasing daily. Monday morning a public hearing on a proposed ordinance by the city of Dallas was held before the commissioners of the city. This ordinance will compel all jitney drivers to file a $10,000 bond with the city assessor and collector of taxes.

As a result of this jitney service the sale of automobiles in the city of Dallas last week broke all former records, 136 licenses for numbers being issued. The former record was eighty-one cars in 1 week. The drivers of jitney cars have organized the Dallas Jitney Assn. and indications are that this service has come for good. The cars run cross town and to all parts of the city. Patrons of the street railways are taking to this new service. In this connection Dallas is leading all other cities of Texas, even having a girl jitney operator.

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BUFFALO, N. Y., March 3—The Buffalo Jitney Bus Co., this city, has been incorporated for $10,000 to run a jitney bus line in this city. The incorporators are: Ella Ryan, R. E. Rayman, O. S. Kinsley, all of the White Bldg., Buffalo.

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Chicago's First Jitney Bus Appears

CHICAGO, ILL., Feb. 27—Chicago's first jitney bus made its appearance on the streets Wednesday and on Friday the number had been increased to four. Three of these are touring cars and one is a limousine. The service was installed on Madison street, a street car line being in operation there. The jitneys run between Halsted street and the loop district, and were installed by James Levy, president of the Chalmers Motor Co., of Illinois, and Nate Jacobs of the Newberry Auto Livery Co.

Limited as the service is in its beginning, it seemed to meet the approval of the public which patronized it to capacity. It is expected that this service with small cars will be extended by private interests. Meanwhile movements are under way by five different concerns toward the establishment of regular bus lines of from eighteen to thirty-passenger cars to operate on the streets and boulevards of the city.

Impetus has been given to this by the decision of the corporation council's office, that no franchises are needed.

The situation is somewhat complicated at the moment by doubt as to whether the boulevards are open to the buses, as these are under the control of the park boards, which are independent of the city authorities.

During the second day of service of the jitneys, the touring cars took in $7 each and the limousine, $7.50.

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Jitney Bus Service for Harrisburg

YORK, PA., Feb. 27—Harrisburg, Pa., is to have a jitney bus service. Application will be made to Governor Brumbaugh on March 18 for a charter to operate a "jitney bus" line in the capital city and between that place and Steelton. The capitalization of the new corporation will be $25,000. Included among the incorporators are: O. M. Copelin, C. E. Covert, Augustus Wildman, A. H. Snavely, H. M. Barnes, all of Harrisburg; I. W. Copelin, of Toledo, O.; and Frank Williamson, of Lancaster. A meeting to elect officers will be held shortly.

Fifty vehicles with not less than twelve or more than twenty-five passenger capacity, will be put in operation and Market Square is the proposed terminal point for lines reaching out in all directions. Whether or not the cars will be double-deckers, similar to the kind used in other cities, has not yet been determined.

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Arrest Women Conductors in New York Buses

NEW YORK CITY, March 3—The women conductors and the drivers of the two jitney buses operated in this city by the People's Five-Cent Bus Corp., were last night summoned to appear in court.

A test case is to be made to establish the right of the new corporation to operate on the city streets.

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PATERSON, N. J., March 2—The first jitneys invasion in the East has commenced in Paterson, N. J. The jitneys are operating in competition with the street car lines of the Public Service Railway Co., one of the operating subsidiaries of the Public Service Corp. of New Jersey and in this way all quarreling is avoided.

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WINNIPEG, MAN., Feb. 23—The jitney bus has now invaded Winnipeg, and over sixty touring cars are plying for hire on various routes in the city. The distance traveled by the majority of the jitneys, is within a 2-mile radius of the City Hall, and the fare is 5 cents. Several of the larger taxicab companies are having special bodies fitted to touring car chassis, with a passenger capacity of fourteen, and judging by the results obtained from the use of touring cars with a capacity of only five passengers, the new type should give excellent results.

A license fee of $10 is charged to all operators of the jitney bus, but this is to be reconsidered by the City Council, owing to representations made on behalf of the Winnipeg Electric Railway Co., who are protesting against the service, owing to inroads on its income.

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Jitney Developments in Ohio Cities

COLUMBUS, O., Feb. 27—The jitney bus fad is not taking as rapidly in Columbus as has been the case in other cities of the country. The number of buses which are being operated by individuals remains about the same as formerly. Lack of patronage has not compelled the owners to consolidate into a concern for the purpose of operating buses on the regular schedules.

One of the reasons given for the partial failure of the idea in the Buckeye capital is the fact that the local street car service is thoroughly well organized. Outside of a few outlying sections the street

car service is good and there are only a few complaints heard. As a result the jitney bus appears to be out of place in Columbus.

In Cleveland the idea is taking root rapidly and organized service on many of the streets is being given. Preparations have been completed for the operation of buses by the Cleveland street car system to compete with the "jitneyites."

In Dayton the jitney buses are also quite popular, and they are having an effect on the earnings of the local street car system. The announcement was made that the traction officials would operate buses in competition with the jitneys.

In Toledo they are also quite popular and the number is gradually increasing. Service has been organized on many of the principal streets of the city, and the people are riding on the buses as a protest against the methods of the traction monopoly.

In Cincinnati quite a few jitney buses have been operated with a measure of success. Service is moved from the center of the city to outlying districts where the street car service was notoriously bad.

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WILLIAMSPORT, PA., Feb. 27—The jitney bus, the automobile trolley car, has invaded Williamsport. The first two cars operated by a newly organized company ran on a belt line, covering West Fourth and West Third streets between Market street, the eastern terminus, and Grier street on the west. The line which opened in Williamsport is one of the first in Pennsylvania. The service is known as the Jitney-Cadillac, although the city Cadillac agency management is in no wise interested in the movement.

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Agitation for Regulating Jitneys

WASHINGTON, D. C., Feb. 28—Decision to allow jitney buses to operate under either of two sections of the license law has been made by the district commissioners after a conference with the promoters of the proposed bus service. One of the sections provides for a $6 annual fee and the other for a fee of $9. The former charge is made for vehicles carrying passengers for hire "over a route sufficiently definite to enable the public to ascertain the streets and avenues on which vehicles can be found en route. The latter fee is for licenses as public hacks. Licenses for operation over definite routes require the approval of the district commissioners.

Several conferences which may result in the incorporation of the Washington Jitney Bus Assn. were held this week with A. I. Hickey, president, in charge. If the association abandons its present identity and becomes a corporation, it will be because backers fear that as soon as the lines are fairly established under certain provisions of the hack law, the city government, seeing the utility of the jitney lines, will attempt to class them as common carriers and bring them under the direction of the public utilities commission, prescribe schedules and otherwise regulate the operation of the buses.

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DENVER, COL., Feb. 24—A mandamus suit to compel Commissioner of Finance C. J. Pitcher to issue 137 permits for automobiles to be used in jitney bus service was filed today in the district court by the Denver Street-Auto Service Corp. The above number of applications filed by this one concern have thus far been refused by Commissioner Pitcher, whose office makes him ex-officio excise commissioner. The city council recently passed a bill declaring a jitney bus line a public utility and requiring any persons or corporations wishing to operate such a service to apply for a regular franchise. But the jitney bus promoters claim they have a right to permits the same as have persons operating taxicab service.

Eighteen five-passenger Ford cars, which the above corporation had purchased and prepared for the service thus far prohibited, were turned over to the Auto Clearing House Co. 2 days ago, and have all been sold.

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DES MOINES, IA., March 2—The jitney bus industry is just 4 weeks old in Des Moines and forty-three jitneys already have been licensed to operate. They are expected to multiply with great rapidity when spring opens. According to the most complete statistics available the jitneys now in service are picking up the cream of the transportation business and getting 10 per cent. of the city railway company's gross receipts. The average gross income of each jitney is about $12 a day and some run as high as $15 a day with a minimum of $10 a day. Cutting the estimates down to the minimum, the jitneys now in service would get $430 a day, indicating an annual income of about $150,000 a year. The annual gross income of the city railway is about $1,300,000.

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ALBANY, N. Y., Feb. 26—Assemblyman G. F. Thompson has introduced a bill providing that all motor vehicles carrying passengers for hire in cities of the first class, excepting New York City, shall be considered as common carriers. The bill exempts from its provisions stage coach and buses operating on state routes or highways, constructed wholly or partly at the expense of the state.

Consolidated Car Co. Expands—Other Late News

DETROIT, MICH., March 3—The Consolidated Car Co., organized to take over the business of the Abbott Motor Co., has completed plans for financing the business on a more extensive scale than originally was contemplated. New capital has been added and C. L. Lewis, of Toledo, O., and his associates have acquired control. Lewis has been elected president and will go to Detroit in the near future to give all his time to affairs of the company. He is secretary and sales manager of the Edward Ford Plate Glass Co., Toledo, and is also a manufacturer of automobile parts and equipment.

A. C. Knapp and R. A. Palmer, who were members of the temporary organization, are no longer connected with the company. M. J. Hammers, D. E. Perry and F. E. Sangbush, who have been active in the management of the Abbott-Detroit business, will continue in like capacities with the Consolidated.

Practically all of the original Abbott-Detroit dealers and distributors have re-contracted with the Consolidated company.

The company is already producing the two models upon which it will specialize—a seven-passenger, six-cylinder touring car, at $2,290, and an eight-cylinder, seven-passenger touring car, listing at $1,885; the former has a Continental motor and the latter a Herschell-Spillman.

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Saxon Makes Record Shipment of 115 Cars

DETROIT, MICH., March 3—The biggest production and shipping day in the history of the Saxon Motor Co., was February 22 when 115 cars were turned over to the railroads. All departments are working full time and although the old Abbott plant, where the Saxon company is now located, is fully one-third larger than the former Saxon home, it is by no means adequate to take care of the increasing business. Further expansion will probably be necessary soon.

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SYRACUSE, N. Y., March 3—The Franklin Automobile Co., this city, recently made a large shipment of cars to the Pacific Northwest. It consisted of a trainload bound for the states of Washington and Oregon. Twenty cars alone were destined for Walla Walla. The rest of the trainload was made up of cars for Pendleton, Ore., and Seattle. In value, this shipment represents almost $70,000.

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Grossman Offers $1.000 Indianapolis Prize

NEW YORK CITY, March 3—The Emil Grossman Mfg. Co., this city, is offering a cash prize of $1,000 to the winner of the 500-mile race to be held at Indianapolis, May 30. The award is conditional on Red Head spark plugs exclusively.

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ELGIN, ILL., March 3—Officers and directors of the Elgin National Road Race Assn. were elected at a meeting held this week as follows: President, James Dorsey; vice-president, John A. Logan; secretary-manager, F. W. Jencks; treasurer, Phillip Freiller; directors, Harry Vissering, W. C. Wilson, Mort Aldridge, E. J. O'Beirne, and W. A. Kerber, Jencks succeeds Wilson as manager and secretary, Wilson, who was secretary, becoming a director. Prospects for successful races this year are bright. Chicago men and officials of the American Automobile Club, which co-operate with the Elgin club in staging the races, declare that the list of entries will contain a longer array of star drivers than ever before. A dividend of 10 per cent. on all stock was declared, payable between March 1 and 10.

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DETROIT, MICH., March 3—The regular quarterly dividend of 1 3-4 per cent. upon the preferred stock of the Packard Motor Car Co. will be paid on March 15 to the stockholders of record at the close of business the first day of March, 1915.

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KANSAS CITY, KAN., March 1—J. H. McDearmon, who has been with John Deere Plow Co., this city, for 11 years, has resigned to become assistant sales manager with the Oakland Motor Co.

Factory Miscellany

STERNBERG Trucks Arrive Safely—Cablegrams were received in Milwaukee on February 26 from France announcing that the shipment of 100 Sternberg army trucks made some weeks ago from Milwaukee by the Sternberg Motor Truck Co. had safely arrived at a French port. The messages were from Norman Sternberg, son of vice-president E. M. Sternberg, who accompanied the shipment with several other factory experts.

Firestone Output Increase 78 Per Cent—The output of the Firestone Tire & Rubber Co., Akron, O., has increased during the last year 78 per cent., and the number of Firestone dealers has been increased 50 per cent.

Excel Rubber Moving to Wadsworth—The Excel Rubber Co. is preparing to move its plant from Akron to Wadsworth, O., where a factory site has been secured near the Erie Railroad. The capital of the company was recently increased from $10,000 to $50,000.

Canadian Goodyear Prospering—The Goodyear Tire & Rubber Co. of Canada will double the capacity of its plant at Bowmanville, Ont. The increased output will also materially effect the cost of production and the consumer will get the benefit by a reduction in price of about 37 per cent., compared with prices of 2 years ago.

Delco's February Shipments Large—February was a banner month for the Dayton Engineering Laboratories Co., Dayton, O., in the way of shipments of the Delco systems. The first week of that month 3,182 complete systems were shipped, the second week 2,836 and the third week 2,575 were shipped. During the last week of February the average has been 280 a day.

Babcock to Build—The Babcock Automobile Spring Co., which was established in Milwaukee, Wis., at 187 Oneida street about 18 months ago, is about to erect a plant in Milwaukee for the manufacture of its products. A contract has been awarded for the erection of a factory building on Milwaukee street, near Chicago street. It will be of solid brick construction, one-story, 40 by 100 feet in size.

Troy Wagon Enlarges—The Troy Wagon Works Co., Troy, O., has started building a new motor truck trailer works, which will cover 16,800 square feet of ground, being 120 by 140 feet in size. The company will turn out more than sixty trailers a week. The company is now making trailers in three sizes—1½-ton, 2½-ton and 5-ton. The 1½-ton is non-reversible, while the other two may be obtained in either reversible or non-reversible types.

Marion in New Indianapolis Plant—The Marion Motor Co., Indianapolis, has secured the four-story building at 430 North Capitol avenue and removed from former location on Oliver avenue. The new location will house the general offices, engineering and service departments, and the small manufacturing that will be done in Indianapolis. The principal factory of the company, which is allied with the Mutual Motors Co., is located at Jackson, Mich.

Studebaker Adds 70,000 Square Feet—A new steel stamping and a new enameling plant is being erected for the Studebaker Corp., Detroit, Mich., to its plant at West Jefferson and Clark avenues. The structure will be four stories high, 220 by 80 feet and have 70,000 square feet of floor space. It will cost $85,000. The first three floors will be used for stamping fenders, oil pans, splash guards, etc., while the top floor will have the enameling ovens. The building is to be ready in 90 days.

Large Canadian Shipments — The Grand Trunk and Grand Trunk Pacific railways have just handled the largest single shipment of motor cars and carriages ever made by a Canadian vehicle factory. The McLaughlin Carriage Co., Ltd., of Oshawa, Ont., shipped this week forty-five carloads, a solid train of its McLaughlin-Buick automobiles and McLaughlin carriages, for Winnipeg, Regina, Saskatoon, Moose Jaw, Edmonton and Calgary, over the Grand Trunk System lines. The vehicles in this train would make a procession 3 miles long.

Hans Equipment Increasing Force—The Hans Motor Equipment Co., of La Crosse, Wis., which was involved in financial difficulties some time ago, has now been re-established on a sound basis and is operating at the largest capacity yet attained by the plant. During last week about twenty-five additional workmen were employed and if the present rush of orders is maintained, the force will be still further increased. The concern manufactures gasoline and oil gauges, pumps and other small equipment which is used by many of the leading car builders of the country.

Reclamation Work on Overland Land—Reclamation work has been started on the land upon which the two large Overland factories will be built in Toledo, O. The foundation of the larger building to be built will rest partly on what was formerly a river bed and partly on the cut-out where a hill once stood. This building will be 1,000 feet long, 200 feet wide, and will consist of two stories and a basement. The second building will be 200 feet square. Together they will contain 17 acres of floor space. When the additions have been completed the Overland factory will have a total of 79 acres of floor space in the Toledo plant alone. This, together with the affiliated Overland plants operated in other cities, will aggregate over 100 acres.

May Locate in Springfield — The Widam Mfg. Co., of New York, is seeking a location for a plant at Springfield, O. Widam is president.

The Automobile Calendar

Mar. 1-5	Wilkesbarre, Pa., Show. Vehicle Trades Assn.
Mar. 1-6	Fargo, N. D., Show, Armory.
Mar.	Benton Harbor, Mich., Show, St. Joseph and Benton Harbor, St. Joseph Garage, St. Joseph.
Mar.	Charlotte, Mich., Show.
Mar. 2-9	Brooklyn, N. Y., Show, Motor Dealers' Assn., 23rd Regiment Armory.
Mar 3	Albany, N. Y., Associated Garages of America, General Convention.
Mar. 3-4-5-6	St. Joseph, Mich., Show, St. Joseph Auto Co. Bldg.
Mar. 4-6	Springfield, Mass., Show; J. H. Graham.
Mar. 6	San Francisco, Cal., Vanderbilt Race, Panama-Pacific Exposition Grounds.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 6-13	New York City, Made in the U. S. A. Exhibition, Grand Central Palace.
Mar. 8-11	Johnstown, Pa., Show.
Mar. 8-13	Indianapolis, Ind., Annual Spring Opening, Indianapolis Auto Trade Assn.
Mar. 8-13	Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 8-13	Utica, N. Y., Utica Automobile Trade Assn.
Mar. 13-20	Harrisburg, Pa., Show Arena, Harrisburg Dealers' Assn.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 17	Venice, Cal., Cal. Grand Prix, 300-Mile Road Race.
Mar. 17-20	Elgin, Ill., Show, W. H. Tidmarsh, Mgr.
Mar. 22-27	Bangor, Me., Show, Bangor Auditorium.
April	Calumet, Mich., Show, Coliseum.
April 3	Paterson, N. J., Show, Auditorium, R. A. Mitchell.
April 16	Manchester, Eng., Show, Ice Palace, North of England Motor Shows, Ltd.
April 20-22	Oklahoma City, Okla., Road Race, S. W. Auto Racing Assn.
May 17-18	Boston, Mass., A. A. A. Annual Meeting.
May 29	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9	Galesburg, Ill., 200-Mile Race, Galesburg District Fair Assn.
June 19	Chicago, Ill., 500-Mile Race, Chicago Speedway.
July 3	Sioux City, Ia., 300-Mile Race, Sioux City Speedway Assn.
July 4-5	Tacoma, Wash., Road Race.
July 5	Omaha, Neb., Speedway Races, Omaha Motor Speedway.
Aug.	Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3	San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21	Elgin, Ill., Road Race.
Sept. 20-25	San Francisco, Cal., International Engineering Congress.

The Week in the Industry

Motor Men in New Roles

LANSDALE Denby Vice-President—Henry Lansdale, until recently general manager of the Krit Motor Car Co., and previously during a period of 6 years with the Cadillac Motor Car Co., Detroit, Mich., has become identified with the Denby Motor Truck Co., having been elected vice-president.

Oscars Indianapolis Goodyear Mgr.—E. B. Oscars has been appointed manager of the Goodyear Tire & Rubber Co., Indianapolis, Ind.

Parker Resigns from Briscoe—B. D. Parker has resigned as advertising manager of the Briscoe Motor Co., Jackson, Mich., and has returned to Detroit to form a connection.

Finney Goodyear Sales Manager—W. E. Finney, who has been connected with the Goodyear Rubber Co. for some years, has been appointed sales manager of the St. Louis, Mo., branch.

Lavoie Oxford Motor Mgr.—A. J. Lavoie has been appointed manager of the Oxford Motor Car Foundries, Ltd., Montreal, Que. This firm is now manufacturing the new Maisonneuve motor truck.

Edwards Heinze Mgr.—The Heinze Electric Co. has opened a branch office at 33 South Eleventh street, Minneapolis, Minn., in charge of William Edwards, formerly manager of the branch in Kansas City.

Haslett Detroit Goodyear Mgr.—W. A. Haslett has been appointed manager of the Detroit (Mich.) branch of the Goodyear Tire & Rubber Co. He was until recently manager of the company's branch in Pittsburgh, Pa.

Sims Timken Advertising Mgr.—F. S. Sims, who was assistant advertising manager of the Timken-Detroit Axle Co., Detroit, Mich., has been appointed advertising manager. E. A. Walton, who held that position, resigned some time ago.

Changes at Springfield—H. H. Bierman has resigned as manager of the Springfield Buick Co.. Springfield, Mass., and he has formed the Springfield Reo Co. with H. P. Gates. G. A. Mevis has been appointed manager of the Buick agency.

Biggers Hyatt Advertising Mgr.—W. E. Biggers, formerly associated with the Packard and the Ford companies, has joined the Hyatt Roller-Bearing Co., Detroit, Mich., in the capacity of advertising manager. His headquarters will be in Detroit.

Caton Makes Change—E. L. Caton, for some time with the Hudson agency in Worcester. Mass., has joined the sales force of the Norcross Automobile Co., in that city, handling the Buick line. He is president of the Worcester Automobile Dealers' Assn.

Burt Assistant General Mgr.—C. R. Burt, for the past year and a half factory manager of the Russell Motor Car Co., Toronto, Ont., has been appointed assistant general manager and elected to the directorship made vacant by the resignation of J. E. Rogers.

Kirby Resigns—T. C. Kirby has resigned from the management of the Montreal Automobile Trade Assn., Montreal, Que., to accept the management of the Canadian Home Markets Assn., an organization formed for the promotion of Made in Canada Goods.

Hexter Republic Sales Manager—P. K. Hexter, formerly president of the Hexter Gas-Electric Vehicle Corp., New York City, has been appointed Eastern district sales manager of the Republic Motor Truck Co., Alma, Mich. He will make his headquarters in New York City and will have charge of all sales made of Republic trucks east of Pittsburgh.

Recent Warner Gear Announcements—The Warner Gear Co., of Muncie, Ind., has recently added about $60,000 worth of new equipment to take care of the heavy increases in production which will be in force at its factory during the next 5 or 6 months. Harry Orr, formerly of the American Locomotive plant at Providence, R. I., comes to the company in the capacity of production manager, taking up his duties March 1.

Dodd and Madden Get Chase Appointments—W. S. Dodds, formerly district manager with the Maccar, and E. R. Madden, who has been connected with the Chase Motor Truck Co., Syracuse, N. Y., for several years, have been appointed division sales managers of that company. Mr. Dodds will establish headquarters at Buffalo and will cover part of New York State, western Pennsylvania and eastern Ohio, while Mr. Madden will cover a western territory with headquarters at Kansas City.

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Garage and Dealers' Field

Moon Closes Big Agency in Seattle—J. C. C. Morris, formerly manager of the Johns-Manville Co., Seattle, Wash., for the entire Northwest, has just closed arrangements with the Moon Motor Car Co., St. Louis, Mo., whereby he handles this entire territory for Moon cars, appointing his own agents, and assuming every detail of the service and management in Washington, Oregon, Idaho, and Western Montana.

Duplex Engine-Governor Moves—The Duplex Engine-Governor Co., New York City, has moved from 80 Maiden Lane to 245 West Fifty-fifth street, that city. This company has taken the front half of the tenth floor of that building and will consolidate into that space its general office, testing and assembling plant. Four companies have already adopted Duplex as standard equipment and that company anticipates that five other companies will so adopt it within the coming 2 months.

Milwaukee Co. Opens Salesroom—The Geuder, Paeschke & Frey Co., Milwaukee, Wis., announces the opening of a sales office at 1308 Majestic Bldg., Detroit. Mich., and the appointment of A. B. Walker as direct factory representative. This company has a very large plant in Milwaukee, covering many acres, and specializes in the manufacture of sheet metal stampings, including oil pans, axle housings, gasoline tanks, mufflers, etc.

McNaul Tire Installation Completed—The McNaul Tire Co. has completed the installation of its plant on Miami street, Toledo, O., and is now manufacturing the McNaul tires there, which heretofore were made for its inventor, W. M. McNaul, by one of the tire manufacturing concerns of Akron, O. Ole Hibner, who is the general sales manager of the company, states that the company has now orders on its books which will keep it busy all year.

N. Y. Store for Owen—R. M. Owen & Co. have arranged for a Broadway location in New York City at Fifty-seventh street, at the southwest corner. The agents in that city for the Owen car are E. S. Partridge and C. H. Page. The two stores in the building are to be remodeled for the uses of the Owen agency. The corner was occupied by the Oldsmobile branch store and the Fifty-seventh street side store by the Lancia.

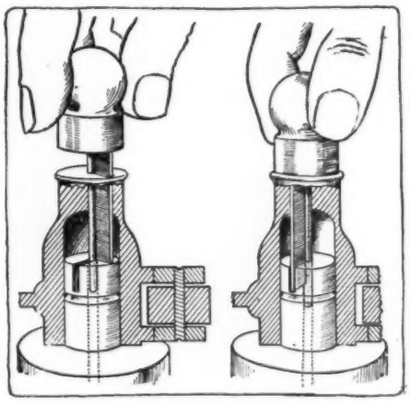
Federal Rubber Employees' Minstrel Show.—Nearly 200 office and shop employees of the Federal Rubber Mfg. Co., of Milwaukee, Wis., appeared in a minstrel show which packed the Pabst theater at Milwaukee on the evening of February 23. A year ago the employees staged a similar show, principally for the entertainment of the entire corps of employees. It was so successful that this year the welfare division arranged a performance for the general public. From now on a pretentious effort will be made each spring to prove the histrionic ability of employees.

Awards Contract for Register—Arthur Fifoot, secretary of the Automobile Club of Hartford, and Albert Simons, a deputy sheriff, have made a contract with the Secretary of State to print and publish the State Automobile Register. This is the first time since the state has conducted a register that it has been issued outside. For some time past this action has been agitated. Mr. Fifoot was formerly registrar of motor vehicles under Secretary of State Max Rogers. The first book will be out shortly. It is estimated that a big saving will be effected by the state allowing the book to be printed by an outside party.

Packard Opens Own Detroit Branch—The Packard Motor Car Co., Detroit, Mich., has decided to open a branch in that city, and beginning March 1 this branch will be located temporarily at the main plant of the company, on East Grand Boulevard. As soon as a suitable location is found in another part of the city a branch salesroom, garage and service station will be erected. The Standard Auto Co., 850 Woodward avenue, which has handled the Packard motor cars for many years, will discontinue that car and instead the company will act as distributor for the state of Michigan and northwestern Ohio for the Detroiter and Scripps-Booth cars.

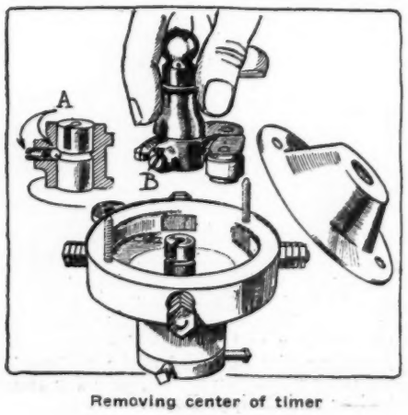
ACCESSORIES

SIMPLE Lighting Outfit—It is often not worth while to spend much on an old car, but it not infrequently happens that owners of old types would like to improve their automobiles by the addition of an electric-lighting outfit. The Eureka outfit consists of a simple little dynamo of the permanent-magnet type complete with a storage battery, lamps and all necessary switches and wiring, the whole selling for an extremely moderate sum. Being supplied with permanent magnets like a magneto the power required to drive the generator is small, and the voltage is kept steady by means of the vee-belt pulley governor. There is a cut-in and cut-out switch located between the magnets, this being operated by the governor through the medium of the pulley. The complete outfit is made in a form that renders its attachment to a Ford car particularly easy, but it can, of course, easily be fitted to any kind of car.—Henricks Magneto & Electric Co., Indianapolis, Ind.



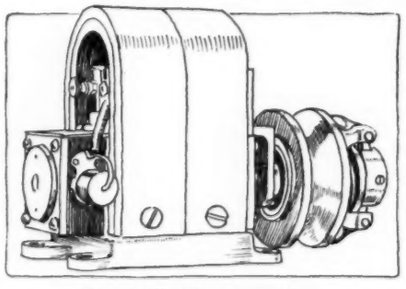
Inserting key in timer lock

Washing Brush—This is an automobile washing brush, which seems to be especially well made and of unusual strength to withstand hard usage. The back plate, which is the essential part of the idea, is aluminum, and it should be observed that the water holes are drilled in the inner edge of the plate. This has the effect of driving the water inward toward the center of the brush and insures a proper spreading of the supply over all the back of the brush, which is less easy to arrange for when water is taken in at the center. Either a brush or a sponge can be clipped in the holder by means of a simple locking device or, if it is desired to cut heavy mud, there is a fine hose nozzle with the equipment that can be used as an extension piece for the handle or by itself to give a strong jet of water.—Peerless Fountain Brush Co., Chicago Ill.



Removing center of timer

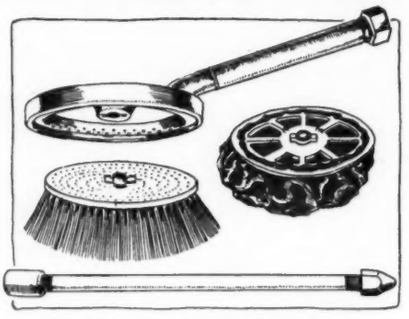
Ignition Automobile Lock—There are many devices intended to render the stealing of an automobile difficult or impossible, and of these one of the latest is called the Atlantic Positive Motor Lock. It is applicable to any car that has timer ignition, and is made so that it is not only of use as a lock, but facilitates the removal of the inner member of the timing distributor for cleaning or examination. The illustrations make clear the operation of the apparatus. Firstly, for locking purposes there is a slot cut in the top of the spindle that projects vertically upwards in the center of the stationary part of the timer, and the revolving member fits snugly over the spindle. It is, however, free to turn on the spindle until the locking key has been inserted. This key can be put in from the top of the cover and slips into the slot cut in the top of the driving spindle, whereupon the timer acts just like any ordinary igniter. The second illustration shows how the center portion of the timer can be removed for cleaning, as the steel ball A has a spring B behind it and this snaps into the groove turned in the spindle. It may be added that turning the motor with the key removed from the timer does not affect the timing when the key is replaced, as it can only slip in its slot when the timer center and the spindle are in the correct relative positions.—Atlantic Machine Co., Brooklyn, N. Y.



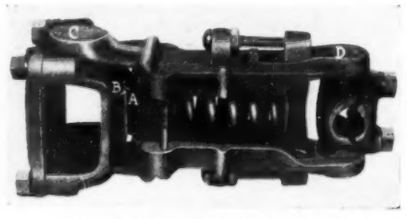
Simple lighting generator

Fan and Horn Combined—The idea of using the motion of the fan to operate a horn diaphragm is ingenious and seems well carried out in the Marvel combination. The diaphragm is located in the center of the fan, and the only attachment is a cable which ends in a push button and can be fixed to any place convenient for the driver. To fit the fan to a Ford it is only necessary to remove the old fan and slip the Marvel into place.—Marvel Auto Supply Co., Cleveland, O.

Steering Steady.—A simple and strong device for attachment to Ford cars is the Savidge apparatus for absorbing shocks on the steering gear and steadying the steering on rough roads or at high speed. Attached to the center of the front axle is the larger of the two clips seen in the illustration, and the smaller is gripped similarly to the middle of the steering tie rod. Each clip has on it a pair of trunions, of which two are shown at C and D and connection between the clips is made by the link containing the heavy coil spring. This spring is adjustable for tension by means of the screws and lock nuts shown and presses upon a sliding block bearing a roller A. On the clip attached to the axle there are two lumps, B, between which the above-mentioned roller normally lies. As the steering is turned the tie rod, of course, moves transversely and carries with it the end of the link which is on the pins D. This swings the link containing the coil spring about the centers of both pins C and D, which causes the roller to mount one of the "lumps" that lie on either side of it. This compresses the spring, which means that the movement is resisted, and there is a natural tendency for the wheels to return to the straight position. It is claimed that the device will eliminate front wheel wobble and makes for safety at all times, while it is obvious that the fitting is simple.—Savidge Steering Device Co., Indianapolis, Ind.



A strong washing brush



Steering Steady for Ford car

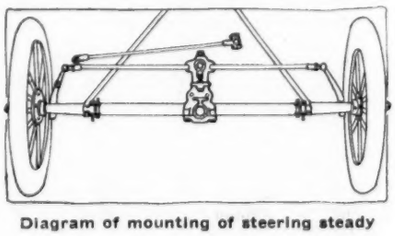


Diagram of mounting of steering steady